

PRELIMINARY DRAINAGE STUDY
IN THE
CITY OF VICTORVILLE
FOR
TENTATIVE TRACT 20275

MARCH 2, 2020



Engineering Communities for Life

Reference: 652-2039

PREPARED BY:

Madole & Associates, Inc.

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A handwritten signature in black ink that reads "Jeff K Rupp".

**JEFFREY K. RUPP
R.C.E. 42868**

3/2/20

Date

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SECTION A-1

INTRODUCTION

TENTATIVE TRACT 20275, VICTORVILLE

DISCUSSION

EXECUTIVE SUMMARY

The following report is a hydrologic analysis of the contributing drainage areas discharging storm water flows from the proposed development of Tentative Tract 20275 in the City of Victorville, County of San Bernardino, California. The proposed tract is located approximately 1-mile south of Palmdale Road on the east side of Monte Vista Road between Luna Road and Manzano Road.

The proposed development will be a residential tract with 3.3 dwellings per acre on about 40.4 gross acres. There will be interior and exterior street improvements with an intract storm drain system that will collect the storm water runoff. The interior storm flows will be directed near the northeast corner of the tract where there will be a site detention and infiltration basin that will also serve as a Water Quality BMP Infiltration Basin. The proposed tract will be a Water Quality "Priority Project".

Net Area:	40.4 acres
Numbered Lots:	135
Units per Acre:	3.3
Minimum Lot Size:	7,200 S.F.
Zoning Land Use:	R-1
General Plan:	Low Density Residential

Owner/Developer: KB Home
36310 Inland Valley Drive
Wildomar, CA 92595

The proposed development will intercept the intract storm water as well as the offsite stormwater from the south boundary of the project and mitigate the 100-year peak runoff flow with the detention basin. The Peak Flow from the proposed development will be reduced to less than the PreDeveloped Peak Flow generated from the project area.

The Basin will also serve to infiltrate runoff from the tract. The Basin will have 1.68 acre-feet of capacity for the the infiltration of low flow runoff.

100-Year Stormwater Runoff
(Table 1-a)

PROJECT AREA (ACRES)	COMBINED PRE-DEV. RUNOFF Q (C.F.S.)	TOTAL DEV. RUNOFF Q (C.F.S.)	TOTAL DEV. RUNOFF Q (C.F.S.)	BASIN PEAK DISCHARGE Q (C.F.S.)
≈40.4 onsite	84.7	58.3	137.3	42
≈83.1 offsite		79		

The Pre-Developed storm water runoff of 84.7 c.f.s. was estimated for the project site. This estimation was based on USGS data for the project area (See Figures 2 and 4) as well as topographic data for the area.

The storm water analysis of the Developed Conditions estimated the unmitigated runoff flow rate of about 137 c.f.s. This included the intract flow of 58 c.f.s., and 79 c.f.s. from the undeveloped adjacent drainage area to the south of the project.

To mitigate Developed Condition storm water discharge to less than the Predeveloped discharge, the intract storm water runoff for the developed condition was routed into and through a proposed detention basin located near the northeastern corner of the project site. The Developed peak flow of 137 c.f.s. was reduced to a discharge of 42 c.f.s.

From the unit hydrograph flood routing analysis, the detention basin would fill to a water surface elevation of 3241.6. The elevation of the top of the basin was set at 3244. The following table is a summary of the detention basin hydrologic analysis performed.

Contributing Drainage Area: 123.5 acres.

TRACT 17046 DETENTION BASIN SUMMARY DATA
(TABLE 1-b)

	RATIONAL Qp INFLOW (C.F.S.)	UNIT HYDRO. Qp INFLOW (C.F.S.)	BASIN BOTTOM ELEV.	PEAK DISCHARGE (C.F.S.)	WATER SURFACE ELEV.	TOP OF BASIN ELEV.	FREEBOARD (FT)	PEAK VOL. STORED (AC.-FT.)	BASIN STORAGE VOL. AT ELEV. 3244 (AC.-FT.)	RUNOFF VOL. (AC.-FT.)
PREDEVEL.	84.7									
DEVELOPED (to Basin)	137.3	140.2	3236	42	3241.6	3244	2.4	4.1	5.78	6.3

TENTATIVE TRACT 20275
VICINITY MAP
FIGURE 1



		DOS PALMAS				
		LUNA ROAD				
BRACEO STREET	VISTA ROAD	PROJECT SITE	DAISY ROAD	VERBENA STREET	BELLFLOWER STREET	
	MONTE	MANZANO ROAD				
		LA MESA ROAD				
		OLIVINE ROAD				

VICINITY MAP
NOT TO SCALE

CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, CALIFORNIA

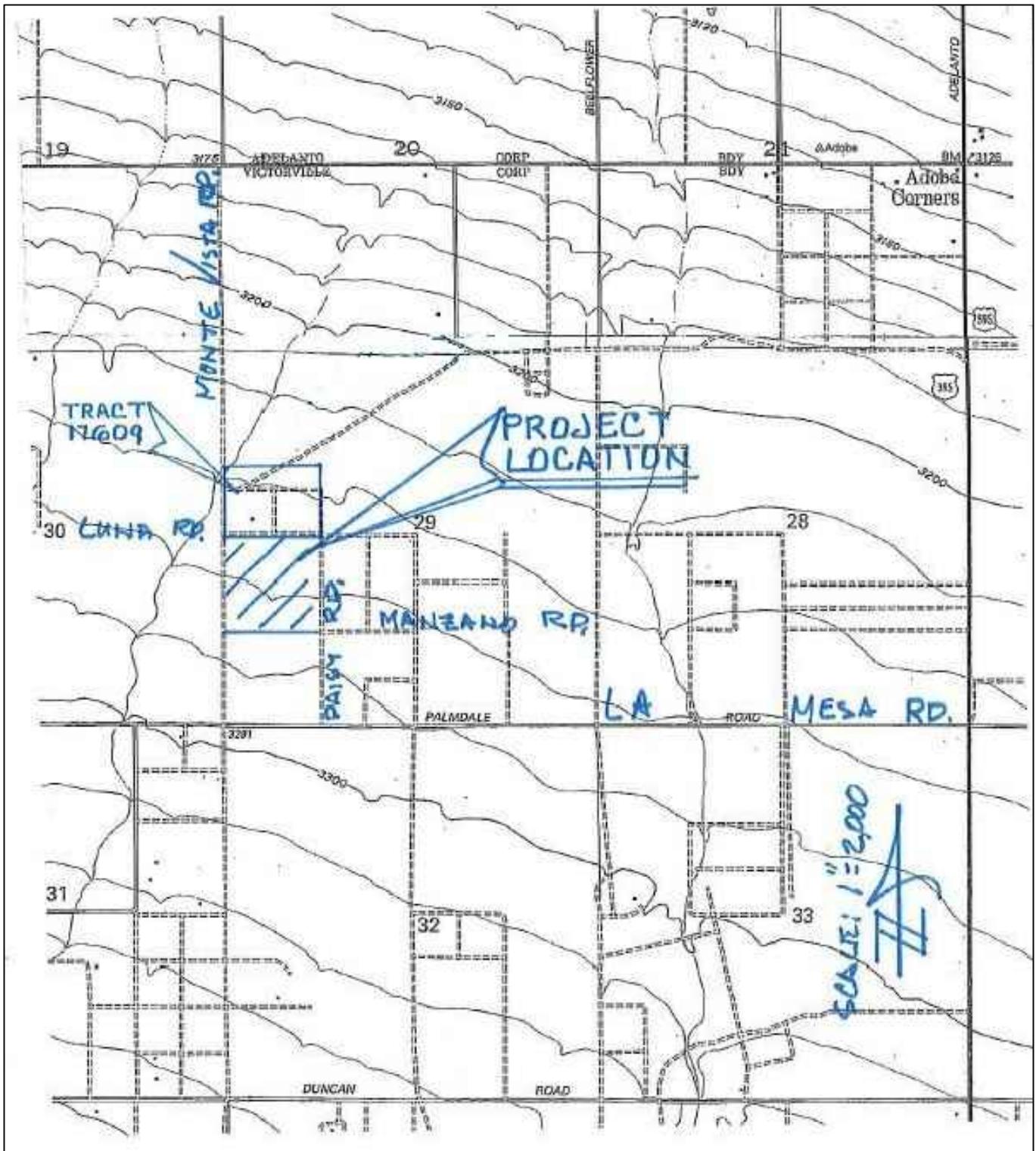


FIGURE 2

VICINITY MAP

TENTATIVE TRACT No. 20275

IN THE CITY OF VICTORVILLE, CA.



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& ASSOCIATES, INC.
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SECTION A-2

SITE DISCUSSION

TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

EXISTING CONDITIONS

The U.S.G.S. topographic contours for this area indicate that the general terrain falls from the south to the north and northeast at about 2% to 3%. The surrounding area is mostly undeveloped. There are some residential housing tracts to the far northwest and east of the project site.

The site itself is sparsely covered with desert brush.

For this general area, the soil is typically silty granular sand.

A review of the PreDeveloped drainage area of the topography over the project site indicates that the general area sheet flows in a northeasterly direction along the Baldy Mesa Master Plan drainage path Line B-01-01. The PreDeveloped topographic site conditions indicate that there are several subareas discharging runoff from the project site area. The estimated PreDeveloped runoff was taken from the subareas that would discharge to the existing drainage swale at the northeastern corner of the project site. The sum total PreDeveloped flow was estimate as 84.7 c.f.s. Areas within the proposed development that would under PreDeveloped conditions not drain to the proposed outlet point were excluded from the sum total (See Figure 4 in Section B).

Prior to the paving of Monte Vista Road in 2006, existing flows from the west side of Monte Vista would flow through the site in Baldy Mesa MPD Line B-01-01. However, the road was paved at an elevation approximately 3 feet below existing grade, creating a berm and drainage channel on the west side of the street. This channel diverts flows that would have crossed the street and into the project site, northerly towards Mariscopa Road. A culvert was constructed beneath the road with then intention of outletting the flows to the east side of the street. However, the construction was never fully completed and the existing 10'x5' R.C.B. is buried and non-operational. Therefore, the only existing flows entering the site come from areas directly south of the project and east of Monte Vista Road.

PROPOSED SITE DEVELOPMENT

This development is a tract in its entirety. The proposed site will intercept the onsite storm water and undeveloped flows from adjacent drainage areas to the south. The 100-year storm water will be intercepted, detained in a detention basin, and discharged at a reduced flow rate. The proposed detention basin will provide retention volume for the on-site developed condition water quality design capture volume. The reduced rate of flow will be discharged from a detention basin located at the northeast corner of the site. The discharge will travel under the proposed developed Luna Road via underground storm drain, then outlet through a culvert and converge with Line B-01-01. The Oro Grande Wash is designated as Line A-01 of the Victorville Master Plan of Drainage (See Figure 8 and Appendix, Section R).

The proposed tract will intercept flows from adjacent areas to the south, and route them through the project site. Future developments to the south will connect to the system and be required to detain flows that would exceed the allowable inflow into the tract from the south.

When Monte Vista Road was paved in 2006, a 10'x5' R.C.B. Culvert was constructed underneath Monte Vista Road to route existing flows within MPD B-01-01 underneath the street. This culvert was never fully completed and has since been buried. It is considered non-operational and flows that would have crossed the undeveloped Monte Vista Road are now routed within an earthen channel north along the westerly side of the street and converge with MPD B-01 well north of the proposed project site.

Based on a discussion with the City of Victorville on December 4th, 2019, since the culvert is non-operational, flows from the west of Monte Vista Road do not need to be mitigated within the project site. Should the culvert become operational, or development occurs to the west, flows will be routed within Monte Vista Road in a future storm water conveyance system instead of through the proposed tract.



FIGURE 3

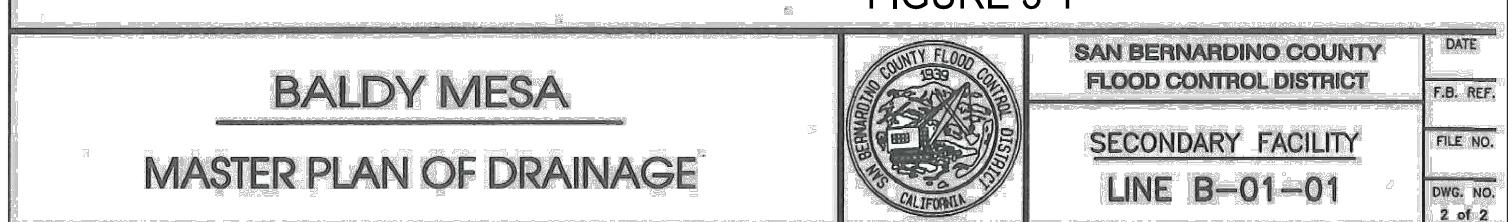
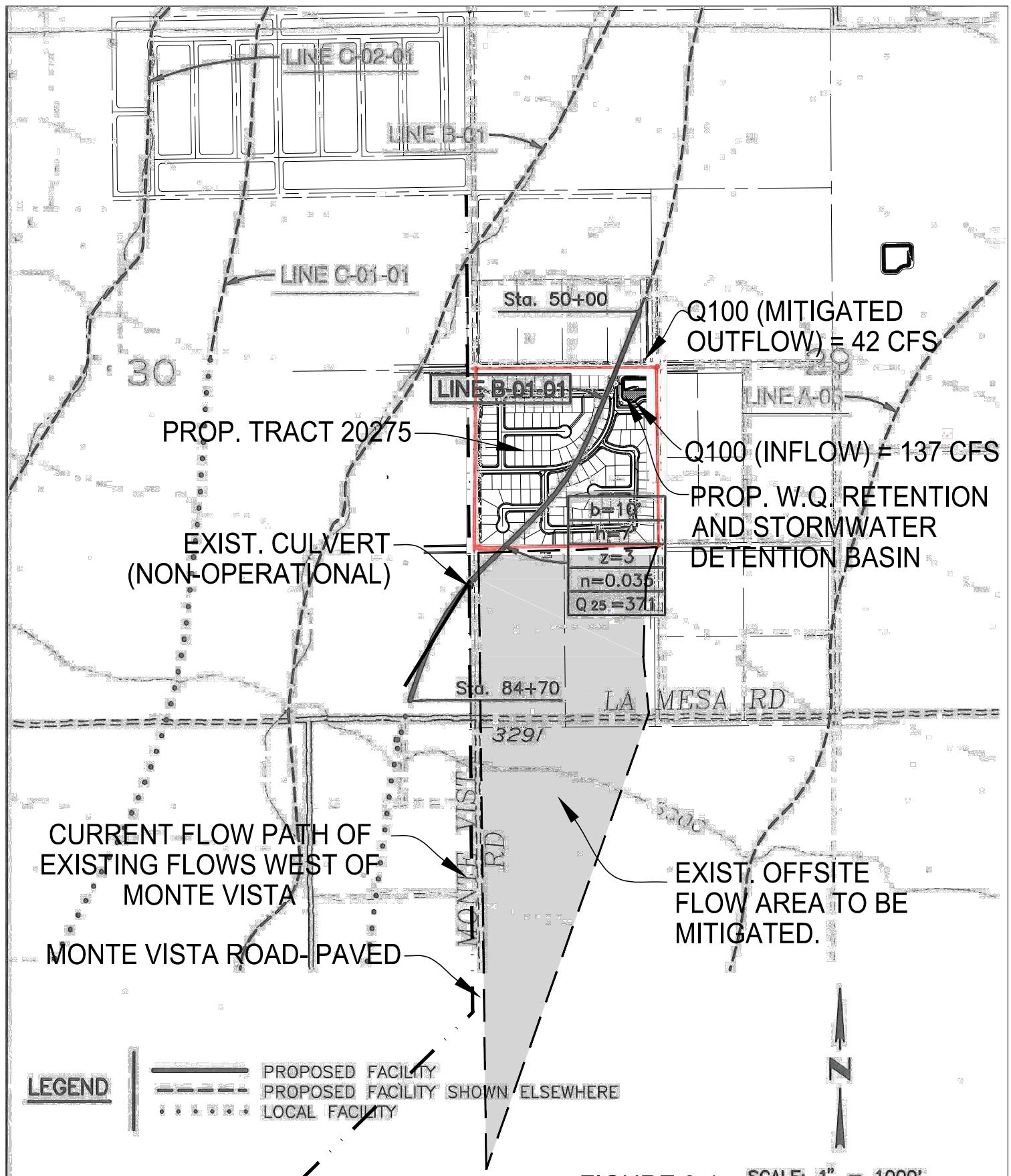


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EXISTING CONDITIONS

TENTATIVE TRACT No. 20275

IN THE CITY OF VICTORVILLE, CA.



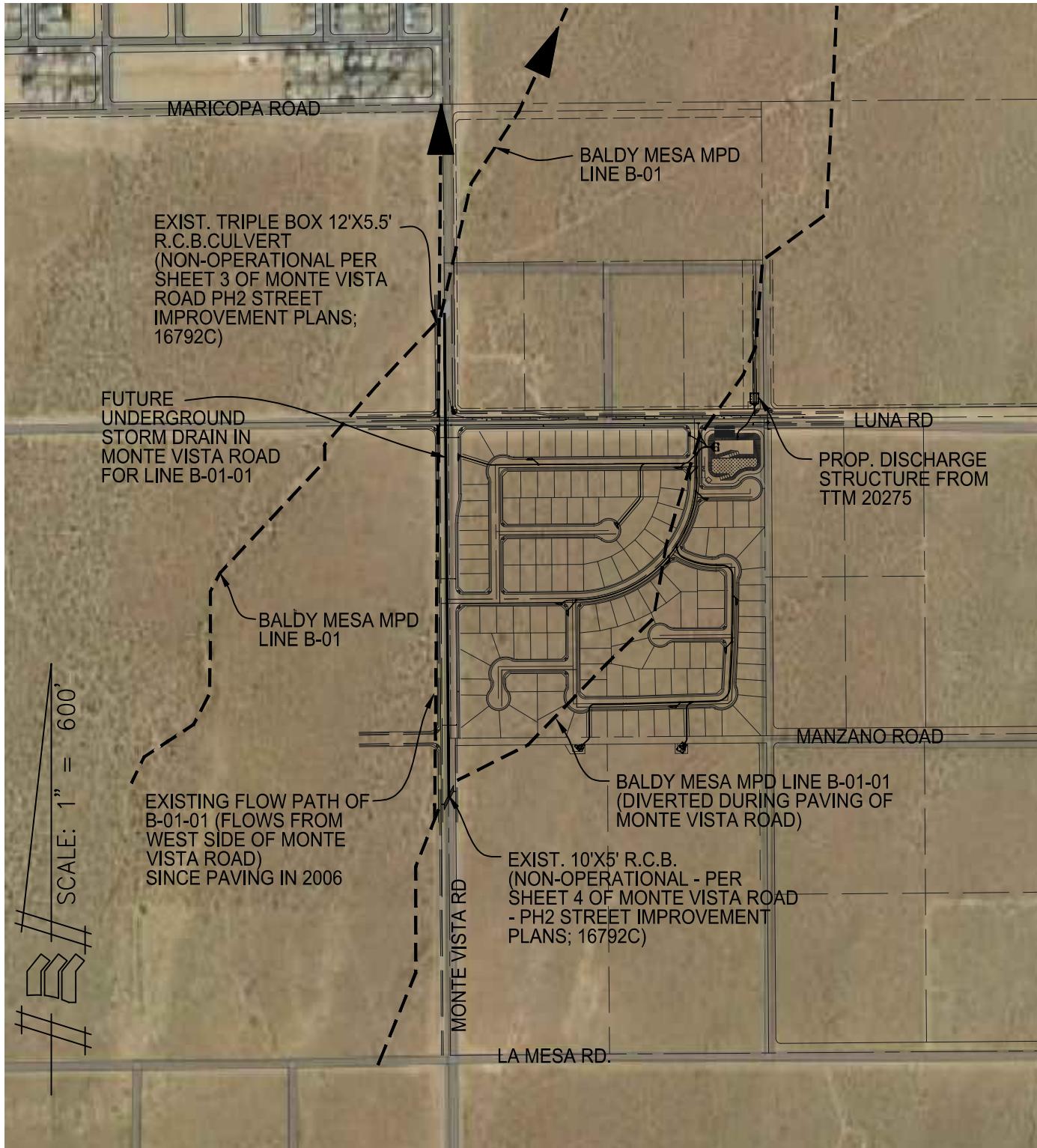


FIGURE 3-2

SECTION A-3
RAINFALL, HYDROLOGIC,
AND LAND USE DATA

METHOD OF STUDY: HYDROLOGY STUDY AND HYDRAULIC CALCULATIONS

Rational Method and Unit Hydrograph Method

The Rational Method of Hydrologic Modeling and the Unit Hydrograph for Catchment Runoff, as defined by the County of San Bernardino Hydrology Manual, 1986, was performed in the estimation of the storm water runoff peak flow rates (See Section B) and flood routing analysis (Section B). AES software was utilized for the hydrologic calculations, street flow analysis, and detention basin analysis.

Hydrologic Data

The storm water runoff losses as listed in Section C of the County's Hydrology Manual were incorporated and accounted for in the study and analysis. The Hydrologic Soil Groups, the Hydrologic Conditions, and the Development Conditions were considered in the estimation of loss rates. For this project:

Soil Groups: B

Rainfall Intensities: Refer to the table on the following page.

(The Hydrologic Soil Group Map and Isohyetal Maps for Desert Area are in Section R Hydrologic References & Maps).

Antecedent Moisture Condition

For this project, AMC II was used in the 100-year study.

(Reference is made to San Bernardino County Hydrology Manual, 1986 and the revision dated April 6, 2010).

Proposed Land Use

RESIDENTIAL

The data input of dwelling units / acre for computer software:

3-4 DU/Ac.

For this project, a Commercial designation was used for the street.

(Refer to Appendix, Section 8.1.4. Hydrologic References & Maps for Impervious Cover for Developed Areas).

SUMMARY:

Rational Method (Reference Appendix, Sections 8.1.1 & 8.1.2)

100-Year Study
AMC II
1-Hour Rainfall Intensity: 1.1 in/hr.
Soil Group B

PreDeveloped Conditions: Desert Brush 50% Coverage

Developed Conditions: 3-4 DU/Ac

Unit Hydrograph Method (Section B)

TENTATIVE TRACT 20275
INPUT SUMMARY FOR UNIT HYDROGRAPH
DEVELOPED CONDITIONS
(Table 3-b)

NODE	SUBAREA	LAG TIME (HR.)	Tc (MIN.)	AREA (AC.)	S-GRAFH	MAX. LOSS, Fm (IN/HR)	LOW LOSS Y-BAR	
10.9	A-D, S, O	0.19	14.5	123.5	DESERT	0.43	0.38	

WATERSHED AREA-AVERAGED POINT RAINFALL DATA
INPUT FOR UNIT HYDROGRAPH
(Table 3-c)

100-YEAR DEVELOPED

5-Minute Point Rainfall	inches	<u>0.34</u>
30-Minute Point Rainfall	inches	<u>0.79</u>
1-Hour Point Rainfall	inches	<u>1.10</u>
3-Hour Point Rainfall	inches	<u>1.49</u>
6-Hour Point Rainfall	inches	<u>1.80</u>
24-Hour Point Rainfall	inches	<u>3.00</u>

SECTION A-4
ONSITE STORM WATER RUNOFF

TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

DISCUSSION OF RESULTS

This drainage study estimated the storm water runoff from the existing predeveloped area of the project site and from the site when developed. A detention basin is proposed for the mitigation of the developed flows to less than the predeveloped discharge rate. The detention basin is proposed for the northeast corner of the tract site.

Basin Flood Routing

The flood routing analysis through the detention basin indicates that the water will fill to a depth of about 5.6 feet (Water Surface Elevation 3241.6) with a unit hydrograph peak inflow of about 140 c.f.s. and an outflow peak discharge flow rate of $Q_{100}=42$ c.f.s. The stored volume at peak flow would be about 4.1 acre-feet. (Refer to Figure 6 and Section B).

The flood routing analysis for the Detention Basin produced a metered peak discharge flow rate of 42 c.f.s. The peak water depth in the detention basin would be about 5.6 feet above the bottom of the Basin (elevation 3236) and a peak stored volume of approximately 4.1 ac-ft.

Proposed Conceptual Inflow Drainage Facilities

The storm water will be intercepted by street improvements and underground storm drain system. The drainage system will convey the runoff to the detention basin.

Proposed Detention Basin Facilities

The detention basin will be constructed to allow retention for water quality low flow infiltration to occur. The basin outlet structure will be set at an elevation above the determined 85th percentile storm water volume to be captured and infiltrated. The water quality volume to be stored is 1.68 ac-ft. The basin outlet will be at elevation 3238.5 and allow a maximum discharge of 42 cfs through a 30" RCP to the north side of Luna Road. The 100-year storm flow is estimated to fill the detention basin to elevation 3241.6, about 5.6 feet above the bottom of the basin.

Proposed Conceptual Outflow Drainage Facilities

The outflow will be metered by a 30" diameter pipe structure located on the north side of the basin. The structure will control the discharge flow rate and meter the flow to less than the pre-developed runoff flow rate.

Mitigated outflow from the detention basin will be routed underneath Luna Road via 30-inch storm drain and outletted on the northern right of way, where it will continue to flow along the existing natural flow path of Baldy Mesa MPD Line B-01-01 and converge with MPD Line B-01. The outlet structure will be hydraulically designed during final engineering.

Contributing Drainage Area: 123.5 acres.

TRACT 17046 DETENTION BASIN SUMMARY DATA
(TABLE 1-b)

	RATIONAL Q _p INFLOW (C.F.S.)	UNIT HYDRO. Q _p INFLOW (C.F.S.)	BASIN BOTTOM ELEV.	PEAK DISCHARGE (C.F.S.)	WATER SURFACE ELEV.	TOP OF BASIN ELEV.	FREEBOARD (FT)	PEAK VOL. STORED (AC.-FT.)	BASIN STORAGE VOL. AT ELEV. 3244 (AC.-FT.)	RUNOFF VOL. (AC.-FT.)
PREDEVEL.	84.7									
DEVELOPED (to Basin)	137.3	140.2	3236	42	3241.6	3244	2.4	4.1	5.78	6.3

SECTION A-5
STORM WATER QUALITY
TREATMENT

TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

DISCUSSION OF RESULTS

This preliminary drainage study estimated the storm water runoff from the developed project site. An onsite drainage system with a detention basin is proposed for the interception, conveyance, and the mitigation of the storm water discharge from the project development.

The detention basin will also serve as the Water Quality BMP. Referring to Figure 6, the basin will be constructed with a high outlet elevation to allow for the retention and infiltration of the determined low flow water quality runoff volume.

A function for the Basin will be to provide water quality interception and infiltration of low flow waters. For the development of Tentative Tract 20275, the Design Capture Volume (DCV) was estimated to 1.44 Acre-Feet (For Water Quality BMP Calculations, Refer to Section R).

Water Quality Depth: 2.2-Feet

Basin Elevation: 3238.2

Basin Outlet Structure Elevation: 3238.5

Storage at Outlet Elevation: 1.68 acre-feet

DCV: 1.44 Acre-Feet

Therefore, adequate volume capacity will be provided in Basin for the runoff infiltration.

Infiltration testing was performed on the site at the proposed area of the basin (See Percolation Report, by Geotek, Inc. in Appendix 8.6). An infiltration rate of 44 in/hr was calculated for the project site. After applying a Factor of Safety of 3.125, the design infiltration rate of the infiltration basin is 14.1 in/hr. Based on this rate the Design Capture Volume would drain within approximately 2.1 hours of filling, therefore avoiding any vector problems on site.

SECTION A-6 CONCLUSION

TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

CONCLUSION

The above hydrologic study showed that the interception of the onsite storm water (developed condition) with street improvements, storm drain system and the detention basin runoff is collected and routed (through the basin) for a reduction of the runoff discharge to less than the combined flows from the predeveloped project site.

PreDeveloped Combined Discharge:	84.7 c.f.s.
Developed Condition Unmitigated Discharge:	137.3 c.f.s.
Mitigated Discharge :	42 c.f.s.

The storm water treatment for Water Quality is addressed with the Basin infiltration of the runoff.

Basin Water Quality Volume:	1.68 Acre-Feet
Project DCV:	1.44 Acre-Feet

The detention basin has adequate volume to detain flows during a 100-year storm event. The study also showed that there would remain about 2.6 feet freeboard within the basin.

A concrete emergency spillway will be implemented in the basin design to accommodate the 1000 year storm. See calculation below for the design width.

EMERGENCY SPILLWAY

DESIGN CAPACITY = 1,000-YEAR PEAK FLOW RATE

$$Q = 1.35 \times Q_{100}$$

$$Q_{100} = \underline{137.3}$$

$$\text{DESIGN } Q = \underline{185.4} \quad \text{C.F.S.}$$

Weir Discharge Equation

(Trapezoidal w/3:1 upstream slope)

$$Q = C L H^{(3/2)}$$

$$Q = \underline{185.4}$$

$$C = 3.08$$

$$H = \underline{1.00}$$

$$L = \underline{60.2} \quad \text{FT.}$$

$$\text{DESIGN } L = \underline{61.0} \quad \text{FT.}$$

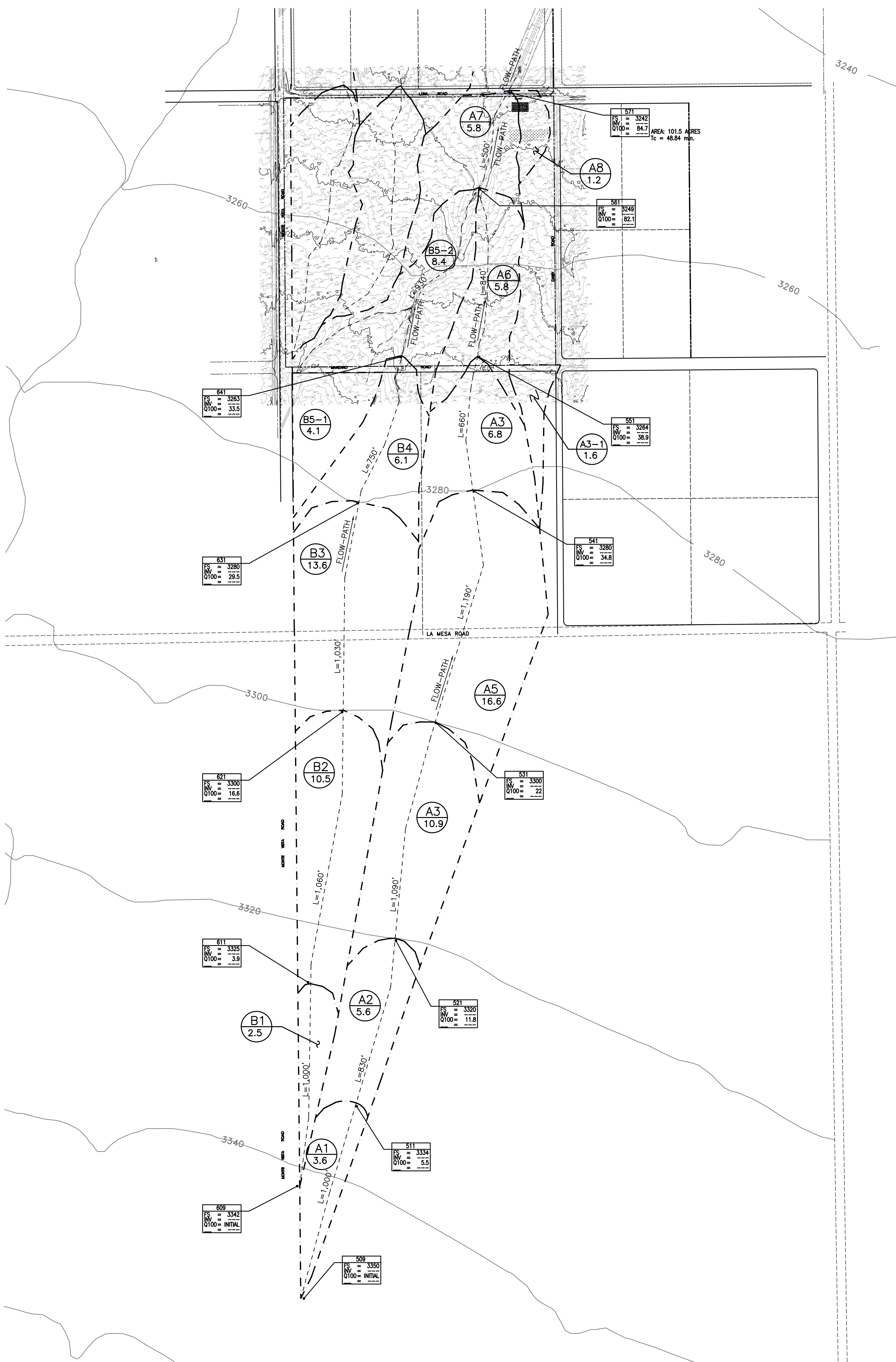
SECTION B
Q100 HYDROLOGY

TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

SECTION B-1
PREDEVELOPED CONDITION
HYDROLOGIC MAP

TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

**100 YEAR PRE-DEVELOPED CONDITION
HYDROLOGIC DRAINAGE MAP
TENTATIVE TRACT No. 20275**



SUMMARY

NODE	AREA	TC	Q100
	ACRES	MIN.	C.F.S.
571	101.5	48.8	84.7

NOTE
ALL SOILS GROUP "B"

KEY

- NODE DESCRIPTION
- SUBAREA DESIGNATION
- LENGTH BETWEEN NODES
- FLOW ARROW
- DRAINAGE BOUNDARY

MAP SHOWS CONTRIBUTORY AREAS
EAST OF MONTE VISTA

12/12/19

SECTION B-1

PREDEVELOPED CONDITION

RATIONAL METHOD ANALYSIS

```
***** RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE *****
```

```
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
```

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(c) Copyright 1983-2009 Advanced Engineering Software (aes)
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Ver. 16.0 Release Date: 04/01/2009 License ID 1251
```

Analysis prepared by:

MADOLE & ASSOCIATES, INC.
9302 Pittsburgh Avenue, Suite 230
Rancho Cucamonga, CA 91730

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***** DESCRIPTION OF STUDY *****
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```
* TRACT 16805 IN THE CITY OF VICTORVILLE *
* 100-YEAR STUDY -- PRE-DEVELOPED CONDITIONS-LUNA AT FENTON *
* JN 652-2039      wli      100ex.dat *
*****
```

FILE NAME: 100EX.DAT

TIME/DATE OF STUDY: 19:31 02/27/2010

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION: =====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00

SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00

SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95

USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.1000

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-CROWN TO WIDTH	CROSSFALL	STREET-CROSSFALL: IN- / OUT-/PARK-	CURB SIDE / SIDE/ WAY	GUTTER-GEOMETRIES: HEIGHT (FT)	WIDTH (FT)	LIP (FT)	HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET

as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)

2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

```
*****
```

FLOW PROCESS FROM NODE 509.00 TO NODE 511.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

```

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 3350.00 DOWNSTREAM(FEET) = 3334.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 25.585
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.998
SUBAREA Tc AND LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA      Fp      Ap      SCS      Tc
    LAND USE              GROUP      (ACRES)   (INCH/HR) (DECIMAL) CN      (MIN.)
NATURAL DESERT COVER
"DESERT BRUSH" (50.0%) C          3.60      0.29      1.000     85      25.58
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.29
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 5.53
TOTAL AREA(ACRES) = 3.60 PEAK FLOW RATE(CFS) = 5.53

*****
FLOW PROCESS FROM NODE 511.00 TO NODE 521.00 IS CODE = 92
-----
>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<
=====

UPSTREAM NODE ELEVATION(FEET) = 3334.00
DOWNSTREAM NODE ELEVATION(FEET) = 3320.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 830.00
"V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
MAXIMUM DEPTH(FEET) = 5.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.719
SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA      Fp      Ap      SCS
    LAND USE              GROUP      (ACRES)   (INCH/HR) (DECIMAL) CN
NATURAL DESERT COVER
"DESERT BRUSH" (50.0%) C          5.60      0.29      1.000     85
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.29
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.12
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.26
AVERAGE FLOW DEPTH(FEET) = 0.23 FLOOD WIDTH(FEET) = 39.61
"V" GUTTER FLOW TRAVEL TIME(MIN.) = 6.12 Tc(MIN.) = 31.71
SUBAREA AREA(ACRES) = 5.60 SUBAREA RUNOFF(CFS) = 7.20
EFFECTIVE AREA(ACRES) = 9.20 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.29 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 9.2 PEAK FLOW RATE(CFS) = 11.83

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) = 0.25 FLOOD WIDTH(FEET) = 43.96
FLOW VELOCITY(FEET/SEC.) = 2.39 DEPTH*VELOCITY(FT*FT/SEC) = 0.61
LONGEST FLOWPATH FROM NODE 509.00 TO NODE 521.00 = 1830.00 FEET.

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*****
FLOW PROCESS FROM NODE 521.00 TO NODE 531.00 IS CODE = 92
-----
>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<
=====
UPSTREAM NODE ELEVATION(FEET) = 3320.00

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DOWNSTREAM NODE ELEVATION(FEET) = 3300.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1090.00
 "V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
 PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
 MAXIMUM DEPTH(FEET) = 5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.504
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL DESERT COVER					
"DESERT BRUSH" (50.0%)	C	10.90	0.29	1.000	85
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR)					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap					
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)					
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)					
AVERAGE FLOW DEPTH(FEET)	= 0.29	FLOOD WIDTH(FEET)	= 50.71		
"V" GUTTER FLOW TRAVEL TIME(MIN.)	= 6.69	Tc(MIN.)	= 38.40		
SUBAREA AREA(ACRES)	= 10.90	SUBAREA RUNOFF(CFS)	= 11.90		
EFFECTIVE AREA(ACRES)	= 20.10	AREA-AVERAGED Fm(INCH/HR)	= 0.29		
AREA-AVERAGED Fp(INCH/HR)	= 0.29	AREA-AVERAGED Ap	= 1.00		
TOTAL AREA(ACRES)	= 20.1	PEAK FLOW RATE(CFS)	= 21.95		

END OF SUBAREA "V" GUTTER HYDRAULICS:

DEPTH(FEET) = 0.31 FLOOD WIDTH(FEET) = 55.05
 FLOW VELOCITY(FEET/SEC.) = 2.85 DEPTH*VELOCITY(FT*FT/SEC) = 0.89
 LONGEST FLOWPATH FROM NODE 509.00 TO NODE 531.00 = 2920.00 FEET.

FLOW PROCESS FROM NODE 531.00 TO NODE 541.00 IS CODE = 92

>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<

UPSTREAM NODE ELEVATION(FEET) = 3300.00
 DOWNSTREAM NODE ELEVATION(FEET) = 3280.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1190.00
 "V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
 PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
 MAXIMUM DEPTH(FEET) = 5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.344
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL DESERT COVER					
"DESERT BRUSH" (50.0%)	C	16.60	0.29	1.000	85
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR)					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap					
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)					
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)					
AVERAGE FLOW DEPTH(FEET)	= 0.35	FLOOD WIDTH(FEET)	= 63.01		
"V" GUTTER FLOW TRAVEL TIME(MIN.)	= 6.68	Tc(MIN.)	= 45.08		
SUBAREA AREA(ACRES)	= 16.60	SUBAREA RUNOFF(CFS)	= 15.74		
EFFECTIVE AREA(ACRES)	= 36.70	AREA-AVERAGED Fm(INCH/HR)	= 0.29		
AREA-AVERAGED Fp(INCH/HR)	= 0.29	AREA-AVERAGED Ap	= 1.00		
TOTAL AREA(ACRES)	= 36.7	PEAK FLOW RATE(CFS)	= 34.81		

END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) = 0.37 FLOOD WIDTH(FEET) = 66.87
 FLOW VELOCITY(FEET/SEC.) = 3.08 DEPTH*VELOCITY(FT*FT/SEC) = 1.14
 LONGEST FLOWPATH FROM NODE 509.00 TO NODE 541.00 = 4110.00 FEET.

 FLOW PROCESS FROM NODE 541.00 TO NODE 551.00 IS CODE = 92

 >>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<
 ======
 UPSTREAM NODE ELEVATION(FEET) = 3280.00
 DOWNSTREAM NODE ELEVATION(FEET) = 3264.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 660.00
 "V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
 PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
 MAXIMUM DEPTH(FEET) = 5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.284
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL DESERT COVER					
"DESERT BRUSH" (50.0%)	C	6.80	0.29	1.000	85
SUBAREA AVERAGE PREVIOUS LOSS RATE, Fp(INCH/HR)				0.29	
SUBAREA AVERAGE PREVIOUS AREA FRACTION, Ap				1.000	
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)				37.85	
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)				3.61	
AVERAGE FLOW DEPTH(FEET)	= 0.36	FLOOD WIDTH(FEET)	= 64.46		
"V" GUTTER FLOW TRAVEL TIME(MIN.)	= 3.05	Tc(MIN.)	= 48.13		
SUBAREA AREA(ACRES)	= 6.80	SUBAREA RUNOFF(CFS)	= 6.08		
EFFECTIVE AREA(ACRES)	= 43.50	AREA-AVERAGED Fm(INCH/HR)	= 0.29		
AREA-AVERAGED Fp(INCH/HR)	= 0.29	AREA-AVERAGED Ap	= 1.00		
TOTAL AREA(ACRES)	= 43.5	PEAK FLOW RATE(CFS)	= 38.90		

END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) = 0.36 FLOOD WIDTH(FEET) = 65.18
 FLOW VELOCITY(FEET/SEC.) = 3.62 DEPTH*VELOCITY(FT*FT/SEC) = 1.31
 LONGEST FLOWPATH FROM NODE 509.00 TO NODE 551.00 = 4770.00 FEET.

 FLOW PROCESS FROM NODE 551.00 TO NODE 561.00 IS CODE = 92

 >>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<
 ======
 UPSTREAM NODE ELEVATION(FEET) = 3264.00
 DOWNSTREAM NODE ELEVATION(FEET) = 3249.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 840.00
 "V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
 PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
 MAXIMUM DEPTH(FEET) = 5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.209
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL DESERT COVER					
"DESERT BRUSH" (50.0%)	C	5.80	0.29	1.000	85

SUBAREA AVERAGE PERVERSIVE LOSS RATE, F_p (INCH/HR) = 0.29
 SUBAREA AVERAGE PERVERSIVE AREA FRACTION, A_p = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 41.30
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.27
 AVERAGE FLOW DEPTH(FEET) = 0.39 FLOOD WIDTH(FEET) = 70.73
 "V" GUTTER FLOW TRAVEL TIME(MIN.) = 4.28 T_c (MIN.) = 52.40
 SUBAREA AREA(ACRES) = 5.80 SUBAREA RUNOFF(CFS) = 4.80
 EFFECTIVE AREA(ACRES) = 49.30 AREA-AVERAGED F_m (INCH/HR) = 0.29
 AREA-AVERAGED F_p (INCH/HR) = 0.29 AREA-AVERAGED A_p = 1.00
 TOTAL AREA(ACRES) = 49.3 PEAK FLOW RATE(CFS) = 40.79

END OF SUBAREA "V" GUTTER HYDRAULICS:

DEPTH(FEET) = 0.39 FLOOD WIDTH(FEET) = 70.25
 FLOW VELOCITY(FEET/SEC.) = 3.28 DEPTH*VELOCITY(FT*FT/SEC) = 1.27
 LONGEST FLOWPATH FROM NODE 509.00 TO NODE 561.00 = 5610.00 FEET.

FLOW PROCESS FROM NODE 561.00 TO NODE 561.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 52.40
 RAINFALL INTENSITY(INCH/HR) = 1.21
 AREA-AVERAGED F_m (INCH/HR) = 0.29
 AREA-AVERAGED F_p (INCH/HR) = 0.29
 AREA-AVERAGED A_p = 1.00
 EFFECTIVE STREAM AREA(ACRES) = 49.30
 TOTAL STREAM AREA(ACRES) = 49.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 40.79

FLOW PROCESS FROM NODE 609.00 TO NODE 611.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00
 ELEVATION DATA: UPSTREAM(FEET) = 3342.00 DOWNSTREAM(FEET) = 3325.00

$T_c = K * [(LENGTH^{**} 3.00) / (ELEVATION CHANGE)]^{**} 0.20$

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 25.276

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.015

SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
NATURAL DESERT COVER						
"DESERT BRUSH" (50.0%)	C	2.50	0.29	1.000	85	25.28
SUBAREA AVERAGE PERVERSIVE LOSS RATE, F_p (INCH/HR)						
SUBAREA AVERAGE PERVERSIVE AREA FRACTION, A_p						
SUBAREA RUNOFF(CFS)		3.88				
TOTAL AREA(ACRES)		2.50	PEAK FLOW RATE(CFS)			
			= 3.88			

FLOW PROCESS FROM NODE 611.00 TO NODE 621.00 IS CODE = 92

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>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<
=====
UPSTREAM NODE ELEVATION(FEET) = 3325.00
DOWNSTREAM NODE ELEVATION(FEET) = 3300.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1060.00
"V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
MAXIMUM DEPTH(FEET) = 5.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.710
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL     AREA      Fp      Ap      SCS
    LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL DESERT COVER
"DESERT BRUSH" (50.0%) C       10.50     0.29     1.000     85
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.29
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 10.45
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.65
AVERAGE FLOW DEPTH(FEET) = 0.23 FLOOD WIDTH(FEET) = 39.13
"V" GUTTER FLOW TRAVEL TIME(MIN.) = 6.66 Tc(MIN.) = 31.94
SUBAREA AREA(ACRES) = 10.50 SUBAREA RUNOFF(CFS) = 13.42
EFFECTIVE AREA(ACRES) = 13.00 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.29 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 13.00 PEAK FLOW RATE(CFS) = 16.62

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END OF SUBAREA "V" GUTTER HYDRAULICS:

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DEPTH(FEET) = 0.27 FLOOD WIDTH(FEET) = 46.85
FLOW VELOCITY(FEET/SEC.) = 2.97 DEPTH*VELOCITY(FT*FT/SEC) = 0.80
LONGEST FLOWPATH FROM NODE 609.00 TO NODE 621.00 = 2060.00 FEET.

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*****FLOW PROCESS FROM NODE 621.00 TO NODE 631.00 IS CODE = 92*****
----->>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<
=====
UPSTREAM NODE ELEVATION(FEET) = 3300.00
DOWNSTREAM NODE ELEVATION(FEET) = 3280.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1030.00
"V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
MAXIMUM DEPTH(FEET) = 5.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.523
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL     AREA      Fp      Ap      SCS
    LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL DESERT COVER
"DESERT BRUSH" (50.0%) C       13.60     0.29     1.000     85
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.29
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 24.15
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.98
AVERAGE FLOW DEPTH(FEET) = 0.32 FLOOD WIDTH(FEET) = 56.50
"V" GUTTER FLOW TRAVEL TIME(MIN.) = 5.75 Tc(MIN.) = 37.69
SUBAREA AREA(ACRES) = 13.60 SUBAREA RUNOFF(CFS) = 15.09
EFFECTIVE AREA(ACRES) = 26.60 AREA-AVERAGED Fm(INCH/HR) = 0.29

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AREA-AVERAGED F_p (INCH/HR) = 0.29 AREA-AVERAGED A_p = 1.00
TOTAL AREA(ACRES) = 26.6 PEAK FLOW RATE(CFS) = 29.52

END OF SUBAREA "V" GUTTER HYDRAULICS:

DEPTH(FEET) = 0.34 FLOOD WIDTH(FEET) = 61.08
FLOW VELOCITY(FEET/SEC.) = 3.13 DEPTH*VELOCITY(FT*FT/SEC) = 1.06
LONGEST FLOWPATH FROM NODE 609.00 TO NODE 631.00 = 3090.00 FEET.

FLOW PROCESS FROM NODE 631.00 TO NODE 641.00 IS CODE = 92

>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<

UPSTREAM NODE ELEVATION(FEET) = 3280.00
DOWNSTREAM NODE ELEVATION(FEET) = 3263.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 750.00
"V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
MAXIMUM DEPTH(FEET) = 5.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.427

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
NATURAL DESERT COVER					
"DESERT BRUSH" (50.0%)	C	6.10	0.29	1.000	85
SUBAREA AVERAGE PVIOUS LOSS RATE, F_p (INCH/HR)					
SUBAREA AVERAGE PVIOUS AREA FRACTION, A_p					
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)					
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)					
AVERAGE FLOW DEPTH(FEET)	= 0.34	FLOOD WIDTH(FEET)	= 61.56		
"V" GUTTER FLOW TRAVEL TIME(MIN.)	= 3.67	Tc(MIN.)	= 41.36		
SUBAREA AREA(ACRES)	= 6.10	SUBAREA RUNOFF(CFS)	= 6.24		
EFFECTIVE AREA(ACRES)	= 32.70	AREA-AVERAGED F_m (INCH/HR)	= 0.29		
AREA-AVERAGED F_p (INCH/HR)	= 0.29	AREA-AVERAGED A_p	= 1.00		
TOTAL AREA(ACRES)	= 32.7	PEAK FLOW RATE(CFS)	= 33.47		

END OF SUBAREA "V" GUTTER HYDRAULICS:

DEPTH(FEET) = 0.35 FLOOD WIDTH(FEET) = 62.29
FLOW VELOCITY(FEET/SEC.) = 3.41 DEPTH*VELOCITY(FT*FT/SEC) = 1.18
LONGEST FLOWPATH FROM NODE 609.00 TO NODE 641.00 = 3840.00 FEET.

FLOW PROCESS FROM NODE 641.00 TO NODE 561.00 IS CODE = 92

>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<

UPSTREAM NODE ELEVATION(FEET) = 3263.00
DOWNSTREAM NODE ELEVATION(FEET) = 3249.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 930.00
"V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
MAXIMUM DEPTH(FEET) = 5.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.315

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/	SCS SOIL	AREA	F_p	A_p	SCS
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LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
NATURAL DESERT COVER					
"DESERT BRUSH" (50.0%)	C	12.50	0.29	1.000	85
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) =		0.29			
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap =		1.000			
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =			39.23		
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =			3.03		
AVERAGE FLOW DEPTH(FEET) =	0.39	FLOOD WIDTH(FEET) =	71.69		
"V" GUTTER FLOW TRAVEL TIME(MIN.) =	5.12	Tc(MIN.) =	46.48		
SUBAREA AREA(ACRES) =	12.50	SUBAREA RUNOFF(CFS) =	11.53		
EFFECTIVE AREA(ACRES) =	45.20	AREA-AVERAGED Fm(INCH/HR) =	0.29		
AREA-AVERAGED Fp(INCH/HR) =	0.29	AREA-AVERAGED Ap =	1.00		
TOTAL AREA(ACRES) =	45.2	PEAK FLOW RATE(CFS) =	41.70		

END OF SUBAREA "V" GUTTER HYDRAULICS:

DEPTH(FEET) =	0.40	FLOOD WIDTH(FEET) =	73.38		
FLOW VELOCITY(FEET/SEC.) =	3.07	DEPTH*VELOCITY(FT*FT/SEC) =	1.23		
LONGEST FLOWPATH FROM NODE	609.00	TO NODE	561.00	=	4770.00 FEET.

FLOW PROCESS FROM NODE 561.00 TO NODE 561.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS =	2				
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:					
TIME OF CONCENTRATION(MIN.) =	46.48				
RAINFALL INTENSITY(INCH/HR) =	1.32				
AREA-AVERAGED Fm(INCH/HR) =	0.29				
AREA-AVERAGED Fp(INCH/HR) =	0.29				
AREA-AVERAGED Ap =	1.00				
EFFECTIVE STREAM AREA(ACRES) =	45.20				
TOTAL STREAM AREA(ACRES) =	45.20				
PEAK FLOW RATE(CFS) AT CONFLUENCE =	41.70				

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	40.79	52.40	1.209	0.29(0.29)	1.00	49.3	509.00
2	41.70	46.48	1.315	0.29(0.29)	1.00	45.2	609.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	82.05	46.48	1.315	0.29(0.29)	1.00	88.9	609.00
2	78.19	52.40	1.209	0.29(0.29)	1.00	94.5	509.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) =	82.05	Tc(MIN.) =	46.48		
EFFECTIVE AREA(ACRES) =	88.93	AREA-AVERAGED Fm(INCH/HR) =	0.29		
AREA-AVERAGED Fp(INCH/HR) =	0.29	AREA-AVERAGED Ap =	1.00		
TOTAL AREA(ACRES) =	94.5				
LONGEST FLOWPATH FROM NODE	509.00	TO NODE	561.00	=	5610.00 FEET.

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*****
FLOW PROCESS FROM NODE    561.00 TO NODE    571.00 IS CODE =  92
-----
>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<
=====
UPSTREAM NODE ELEVATION(FEET) =    3249.00
DOWNSTREAM NODE ELEVATION(FEET) =    3242.00
CHANNEL LENGTH THRU SUBAREA(FEET) =    500.00
"V" GUTTER WIDTH(FEET) =    5.00    GUTTER HIKE(FEET) =    0.050
PAVEMENT LIP(FEET) =    0.010    MANNING'S N = .0200
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
MAXIMUM DEPTH(FEET) =    5.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =    1.271
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL     AREA      Fp      Ap      SCS
    LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL DESERT COVER
"DESERT BRUSH" (50.0%) C       5.80      0.29      1.000     85
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.29
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    84.61
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    3.54
AVERAGE FLOW DEPTH(FEET) =    0.52    FLOOD WIDTH(FEET) =    97.50
"V" GUTTER FLOW TRAVEL TIME(MIN.) =    2.35    Tc(MIN.) =    48.84
SUBAREA AREA(ACRES) =    5.80      SUBAREA RUNOFF(CFS) =    5.12
EFFECTIVE AREA(ACRES) =    94.73      AREA-AVERAGED Fm(INCH/HR) =    0.29
AREA-AVERAGED Fp(INCH/HR) =    0.29      AREA-AVERAGED Ap =    1.00
TOTAL AREA(ACRES) =    100.3      PEAK FLOW RATE(CFS) =    83.60

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) = 0.52    FLOOD WIDTH(FEET) = 97.02
FLOW VELOCITY(FEET/SEC.) = 3.54    DEPTH*VELOCITY(FT*FT/SEC) = 1.84
LONGEST FLOWPATH FROM NODE    509.00 TO NODE    571.00 = 6110.00 FEET.

*****
FLOW PROCESS FROM NODE    571.00 TO NODE    571.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 48.84
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.271
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL     AREA      Fp      Ap      SCS
    LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL DESERT COVER
"DESERT BRUSH" (50.0%) C       1.20      0.29      1.000     85
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.29
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    1.06
EFFECTIVE AREA(ACRES) =    95.93      AREA-AVERAGED Fm(INCH/HR) =    0.29
AREA-AVERAGED Fp(INCH/HR) =    0.29      AREA-AVERAGED Ap =    1.00
TOTAL AREA(ACRES) =    101.5      PEAK FLOW RATE(CFS) =    84.66

=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) =    101.5    TC(MIN.) =    48.84
EFFECTIVE AREA(ACRES) =    95.93    AREA-AVERAGED Fm(INCH/HR) =    0.29
```

AREA-AVERAGED F_p (INCH/HR) = 0.29 AREA-AVERAGED A_p = 1.000
PEAK FLOW RATE(CFS) = 84.66

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	$F_p(F_m)$ (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	84.66	48.84	1.271	0.29(0.29)	1.00	95.9	609.00
2	80.60	54.78	1.172	0.29(0.29)	1.00	101.5	509.00

=====

=====

END OF RATIONAL METHOD ANALYSIS

SECTION B-2
DEVELOPED CONDITION
HYDROLOGIC MAP

TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

**100 YEAR DEVELOPED CONDITION
HYDROLOGIC DRAINAGE MAP
TENTATIVE TRACT No. 20275**

SEE SHEET 2

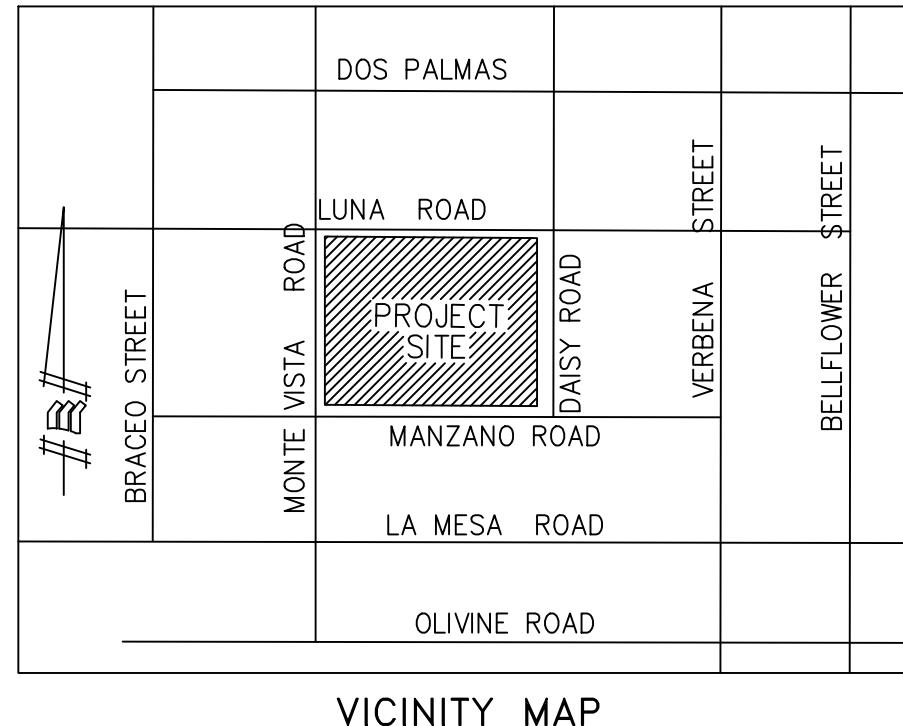
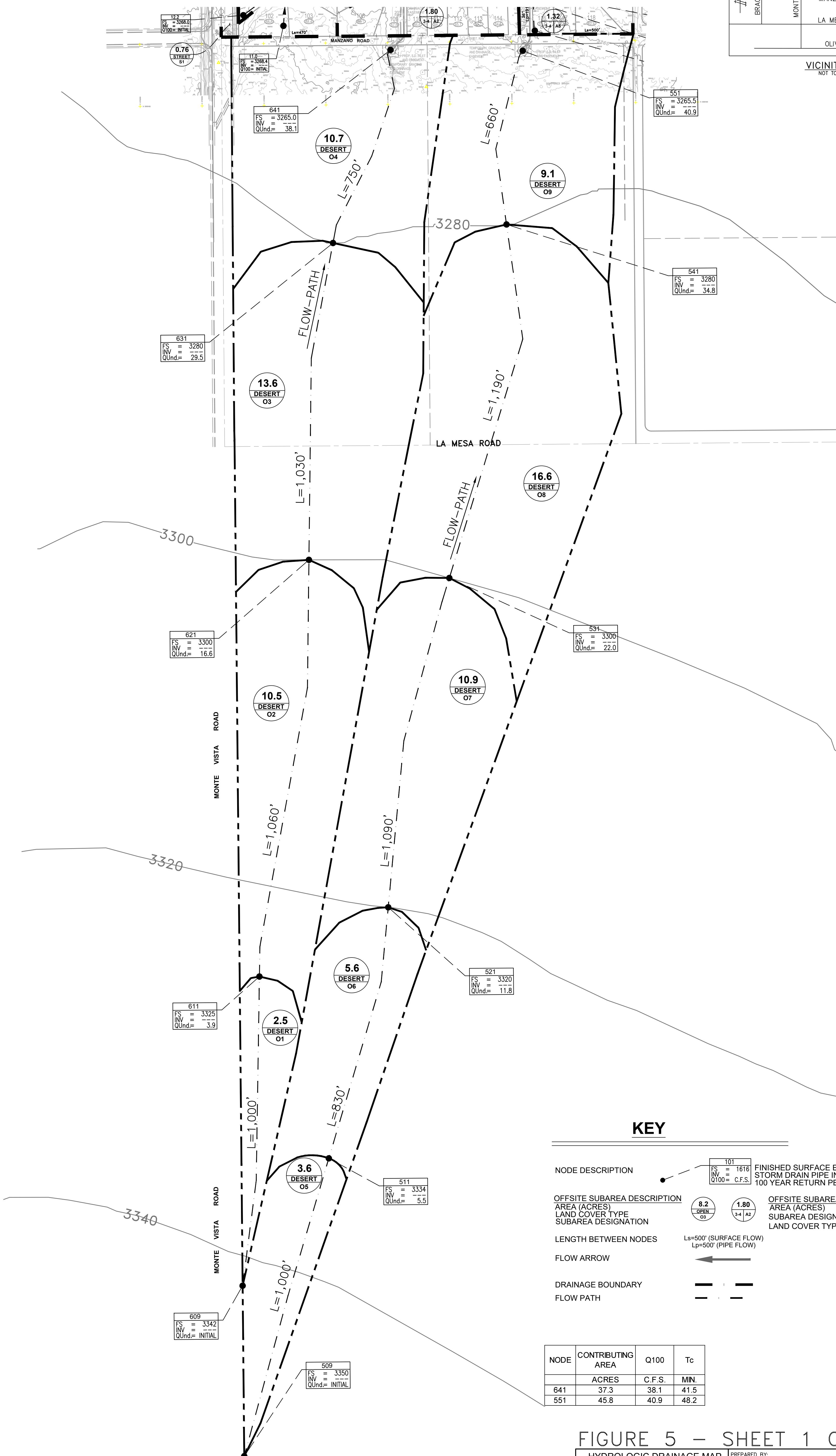
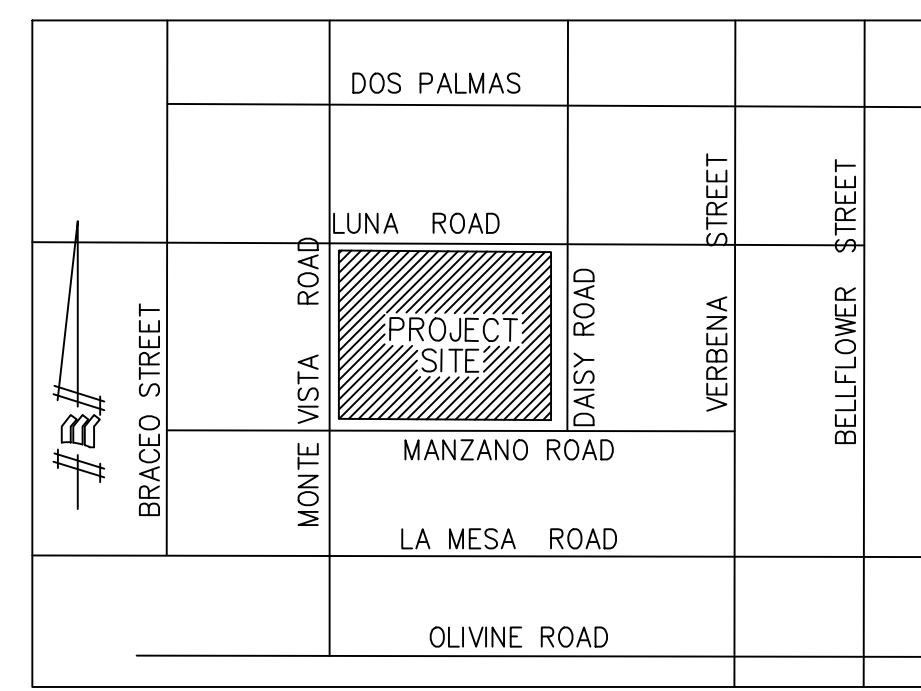


FIGURE 5 – SHEET 1 OF 2

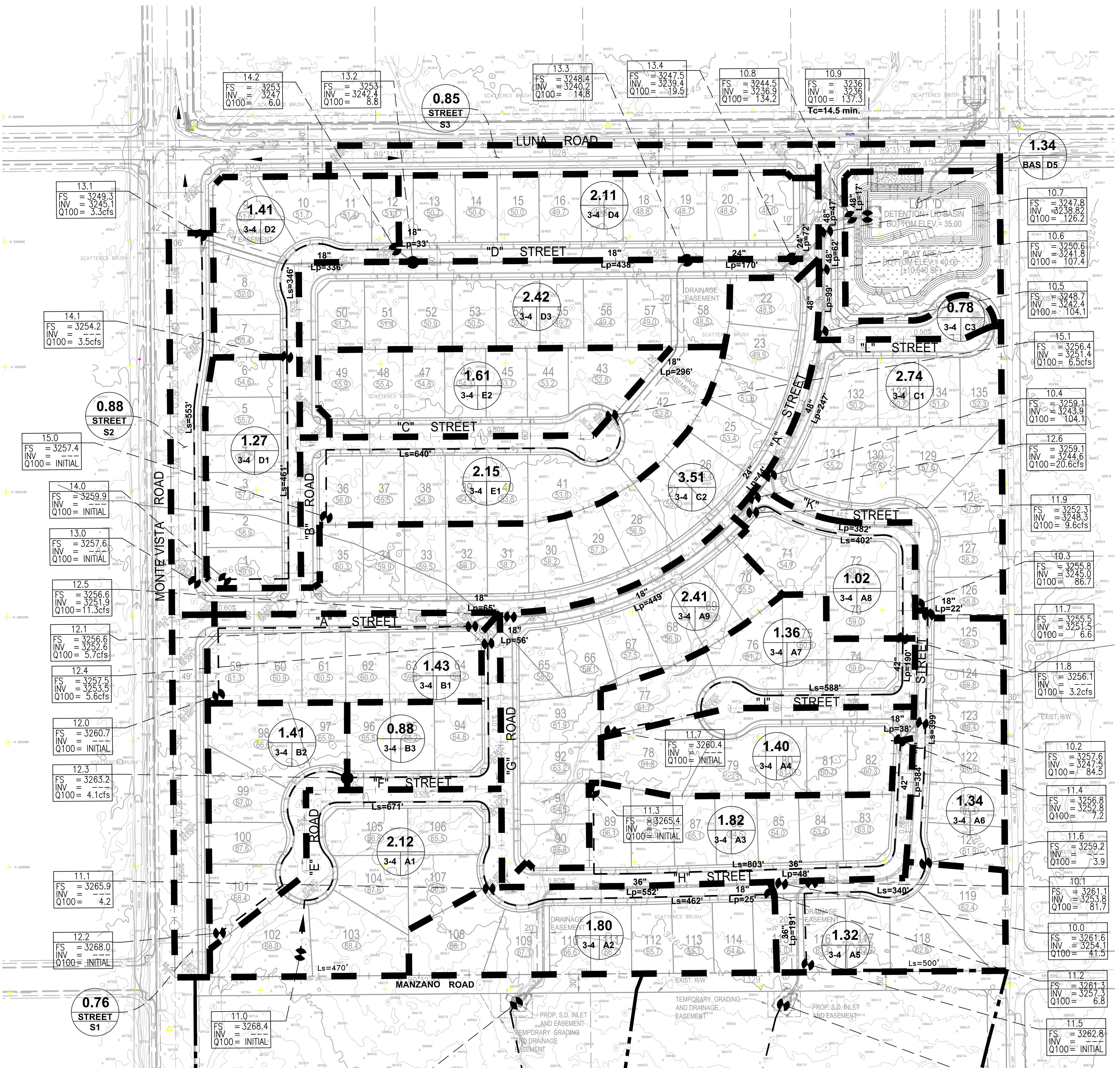
**HYDROLOGIC DRAINAGE MAP
TENTATIVE TRACT
No. 20275**
100 YEAR DEVELOPED CONDITION

PREPARED BY:
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PHONE: 909.481.6322
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SCALE: 1=150'
J.N.: 652-2039
DATE: 04/2019
SHEET 01 OF 02

**100 YEAR DEVELOPED CONDITION
HYDROLOGIC DRAINAGE MAP
TENTATIVE TRACT No. 20275**



VICINITY MAP
NOT TO SCALE



SECTION B-2
DEVELOPED CONDITION RATIONAL
METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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Ver. 23.0 Release Date: 07/01/2016 License ID 1251

Analysis prepared by:

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RANCHO CUCAMONGA, CA 91730

```
***** DESCRIPTION OF STUDY *****
```

* TENTATIVE TRACT MAP No. 20275 - CITY OF VICTORVILLE, CA *
* 100 YEAR RATIONAL METHOD ANALYSIS - DEVELOPED CONDITION *
* 04/30/2019 TGS 20275DEV.DAT *

FILE NAME: 20275DEV.DAT

TIME/DATE OF STUDY: 09:25 05/01/2019

===== USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00

SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00

SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95

USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.1000

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL
HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
NO. (FT) (FT) SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n)
==== ===== ====== ====== ===== ===== ===== ====== ====== ======

1	30.0	20.0	0.020/0.020/0.020	0.67	1.50	0.0312	0.167	0.0150
---	------	------	-------------------	------	------	--------	-------	--------

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

```
*****
```

FLOW PROCESS FROM NODE 609.00 TO NODE 611.00 IS CODE = 21

----->>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

```

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 3342.00 DOWNSTREAM(FEET) = 3325.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 25.276
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.015
SUBAREA Tc AND LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA      Fp      Ap      SCS      Tc
    LAND USE              GROUP      (ACRES)   (INCH/HR) (DECIMAL) CN      (MIN.)
NATURAL DESERT COVER
"DESERT BRUSH" (50.0%) C          2.50      0.29      1.000     85      25.28
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.29
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 3.88
TOTAL AREA(ACRES) = 2.50 PEAK FLOW RATE(CFS) = 3.88

*****
FLOW PROCESS FROM NODE 611.00 TO NODE 621.00 IS CODE = 91
-----
>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<
=====

UPSTREAM NODE ELEVATION(FEET) = 3325.00
DOWNSTREAM NODE ELEVATION(FEET) = 3300.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1060.00
"V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
MAXIMUM DEPTH(FEET) = 5.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.710
SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA      Fp      Ap      SCS
    LAND USE              GROUP      (ACRES)   (INCH/HR) (DECIMAL) CN
NATURAL DESERT COVER
"DESERT BRUSH" (50.0%) C          10.50      0.29      1.000     85
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.29
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 10.45
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.65
AVERAGE FLOW DEPTH(FEET) = 0.23 FLOOD WIDTH(FEET) = 39.13
"V" GUTTER FLOW TRAVEL TIME(MIN.) = 6.66 Tc(MIN.) = 31.94
SUBAREA AREA(ACRES) = 10.50 SUBAREA RUNOFF(CFS) = 13.42
EFFECTIVE AREA(ACRES) = 13.00 AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.29 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) = 13.0 PEAK FLOW RATE(CFS) = 16.62

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) = 0.27 FLOOD WIDTH(FEET) = 46.85
FLOW VELOCITY(FEET/SEC.) = 2.97 DEPTH*VELOCITY(FT*FT/SEC) = 0.80
LONGEST FLOWPATH FROM NODE 609.00 TO NODE 621.00 = 2060.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 621.00 TO NODE 631.00 IS CODE = 91
-----
>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<
=====
UPSTREAM NODE ELEVATION(FEET) = 3300.00

```

DOWNSTREAM NODE ELEVATION(FEET) = 3280.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1030.00
 "V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
 PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
 MAXIMUM DEPTH(FEET) = 5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.523
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL DESERT COVER					
"DESERT BRUSH" (50.0%)	C	13.60	0.29	1.000	85
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR)					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap					
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)					
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)					
AVERAGE FLOW DEPTH(FEET)	= 0.32	FLOOD WIDTH(FEET)	= 56.50		
"V" GUTTER FLOW TRAVEL TIME(MIN.)	= 5.75	Tc(MIN.)	= 37.69		
SUBAREA AREA(ACRES)	= 13.60	SUBAREA RUNOFF(CFS)	= 15.09		
EFFECTIVE AREA(ACRES)	= 26.60	AREA-AVERAGED Fm(INCH/HR)	= 0.29		
AREA-AVERAGED Fp(INCH/HR)	= 0.29	AREA-AVERAGED Ap	= 1.00		
TOTAL AREA(ACRES)	= 26.6	PEAK FLOW RATE(CFS)	= 29.52		

END OF SUBAREA "V" GUTTER HYDRAULICS:

DEPTH(FEET) = 0.34 FLOOD WIDTH(FEET) = 61.08
 FLOW VELOCITY(FEET/SEC.) = 3.13 DEPTH*VELOCITY(FT*FT/SEC) = 1.06
 LONGEST FLOWPATH FROM NODE 609.00 TO NODE 631.00 = 3090.00 FEET.

FLOW PROCESS FROM NODE 631.00 TO NODE 641.00 IS CODE = 91

>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<

UPSTREAM NODE ELEVATION(FEET) = 3280.00
 DOWNSTREAM NODE ELEVATION(FEET) = 3265.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 750.00
 "V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
 PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
 MAXIMUM DEPTH(FEET) = 5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.424
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL DESERT COVER					
"DESERT BRUSH" (50.0%)	C	10.70	0.29	1.000	85
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR)					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap					
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)					
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)					
AVERAGE FLOW DEPTH(FEET)	= 0.36	FLOOD WIDTH(FEET)	= 64.94		
"V" GUTTER FLOW TRAVEL TIME(MIN.)	= 3.81	Tc(MIN.)	= 41.50		
SUBAREA AREA(ACRES)	= 10.70	SUBAREA RUNOFF(CFS)	= 10.92		
EFFECTIVE AREA(ACRES)	= 37.30	AREA-AVERAGED Fm(INCH/HR)	= 0.29		
AREA-AVERAGED Fp(INCH/HR)	= 0.29	AREA-AVERAGED Ap	= 1.00		
TOTAL AREA(ACRES)	= 37.3	PEAK FLOW RATE(CFS)	= 38.07		

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) = 0.37 FLOOD WIDTH(FEET) = 67.11
FLOW VELOCITY(FEET/SEC.) = 3.35 DEPTH*VELOCITY(FT*FT/SEC) = 1.24
LONGEST FLOWPATH FROM NODE 609.00 TO NODE 641.00 = 3840.00 FEET.

FLOW PROCESS FROM NODE 641.00 TO NODE 10.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 3265.00 DOWNSTREAM(FEET) = 3254.10
FLOW LENGTH(FEET) = 552.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 16.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.34
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 38.07
PIPE TRAVEL TIME(MIN.) = 0.75 Tc(MIN.) = 42.24
LONGEST FLOWPATH FROM NODE 609.00 TO NODE 10.00 = 4392.00 FEET.

FLOW PROCESS FROM NODE 10.00 TO NODE 10.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 42.24
RAINFALL INTENSITY(INCH/HR) = 1.41
AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.29
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 37.30
TOTAL STREAM AREA(ACRES) = 37.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 38.07

FLOW PROCESS FROM NODE 11.00 TO NODE 11.10 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 671.00
ELEVATION DATA: UPSTREAM(FEET) = 3268.40 DOWNSTREAM(FEET) = 3265.90

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 17.035

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.656

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	2.12	0.75	0.600	56	17.04
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR)				0.75		
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap				0.600		
SUBAREA RUNOFF(CFS)		4.21				
TOTAL AREA(ACRES)		2.12	PEAK FLOW RATE(CFS)	=	4.21	

```

*****
FLOW PROCESS FROM NODE      11.10 TO NODE      11.20 IS CODE =  62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION #  1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 3265.90  DOWNSTREAM ELEVATION(FEET) = 3261.30
STREET LENGTH(FEET) = 462.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.78
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.45
HALFSTREET FLOOD WIDTH(FEET) = 14.02
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.73
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.23
STREET FLOW TRAVEL TIME(MIN.) = 2.82   Tc(MIN.) = 19.85
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.386
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
        LAND USE          GROUP     (ACRES)   (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"3-4 DWELLINGS/ACRE"      B           1.80      0.75      0.600      56
SUBAREA AVERAGE PEROVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PEROVIOUS AREA FRACTION, AP = 0.600
SUBAREA AREA(ACRES) = 1.80      SUBAREA RUNOFF(CFS) = 3.14
EFFECTIVE AREA(ACRES) = 3.92      AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.75      AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 3.9      PEAK FLOW RATE(CFS) = 6.83

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47  HALFSTREET FLOOD WIDTH(FEET) = 14.96
FLOW VELOCITY(FEET/SEC.) = 2.86  DEPTH*VELOCITY(FT*FT/SEC.) = 1.34
LONGEST FLOWPATH FROM NODE      11.00 TO NODE      11.20 = 1133.00 FEET.

*****
FLOW PROCESS FROM NODE      11.20 TO NODE      10.00 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 3257.30  DOWNSTREAM(FEET) = 3254.10
FLOW LENGTH(FEET) = 25.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.86
GIVEN PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.83

```

PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 19.88
LONGEST FLOWPATH FROM NODE 11.00 TO NODE 10.00 = 1158.00 FEET.

FLOW PROCESS FROM NODE 10.00 TO NODE 10.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 19.88
RAINFALL INTENSITY(INCH/HR) = 2.38
AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.75
AREA-AVERAGED Ap = 0.60
EFFECTIVE STREAM AREA(ACRES) = 3.92
TOTAL STREAM AREA(ACRES) = 3.92
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.83

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	38.07	42.24	1.406	0.29(0.29)	1.00	37.3	609.00
2	6.83	19.88	2.383	0.75(0.45)	0.60	3.9	11.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	40.43	19.88	2.383	0.34(0.32)	0.93	21.5	11.00
2	41.45	42.24	1.406	0.32(0.31)	0.96	41.2	609.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 41.45 Tc(MIN.) = 42.24
EFFECTIVE AREA(ACRES) = 41.22 AREA-AVERAGED Fm(INCH/HR) = 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.32 AREA-AVERAGED Ap = 0.96
TOTAL AREA(ACRES) = 41.2
LONGEST FLOWPATH FROM NODE 609.00 TO NODE 10.00 = 4392.00 FEET.

FLOW PROCESS FROM NODE 10.00 TO NODE 10.10 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 3254.10 DOWNSTREAM(FEET) = 3253.80
FLOW LENGTH(FEET) = 48.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 24.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.09
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 41.45
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 42.34
LONGEST FLOWPATH FROM NODE 609.00 TO NODE 10.10 = 4440.00 FEET.

```
*****
FLOW PROCESS FROM NODE      10.10 TO NODE      10.10 IS CODE =    1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) =   42.34
RAINFALL INTENSITY(INCH/HR) =   1.40
AREA-AVERAGED Fm(INCH/HR) =   0.31
AREA-AVERAGED Fp(INCH/HR) =   0.32
AREA-AVERAGED Ap =   0.96
EFFECTIVE STREAM AREA(ACRES) =      41.22
TOTAL STREAM AREA(ACRES) =      41.22
PEAK FLOW RATE(CFS) AT CONFLUENCE =      41.45

*****
FLOW PROCESS FROM NODE      509.00 TO NODE      511.00 IS CODE =  21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1000.00
ELEVATION DATA: UPSTREAM(FEET) = 3350.00 DOWNSTREAM(FEET) = 3334.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 25.585
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.998
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS      Tc
  LAND USE                GROUP    (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL DESERT COVER
"DESERT BRUSH" (50.0%) C      3.60      0.29      1.000     85    25.58
SUBAREA AVERAGE PEROVIOUS LOSS RATE, Fp(INCH/HR) = 0.29
SUBAREA AVERAGE PEROVIOUS AREA FRACTION, AP = 1.000
SUBAREA RUNOFF(CFS) =      5.53
TOTAL AREA(ACRES) =      3.60 PEAK FLOW RATE(CFS) =      5.53

*****
FLOW PROCESS FROM NODE      511.00 TO NODE      521.00 IS CODE =  91
-----
>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<
=====
UPSTREAM NODE ELEVATION(FEET) = 3334.00
DOWNSTREAM NODE ELEVATION(FEET) = 3320.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 830.00
"V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
MAXIMUM DEPTH(FEET) = 5.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.719
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS
  LAND USE                GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
NATURAL DESERT COVER
"DESERT BRUSH" (50.0%) C      5.60      0.29      1.000     85
SUBAREA AVERAGE PEROVIOUS LOSS RATE, Fp(INCH/HR) = 0.29
```

SUBAREA AVERAGE PEROVIOUS AREA FRACTION, Ap = 1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.12
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.26
 AVERAGE FLOW DEPTH(FEET) = 0.23 FLOOD WIDTH(FEET) = 39.61
 "V" GUTTER FLOW TRAVEL TIME(MIN.) = 6.12 Tc(MIN.) = 31.71
 SUBAREA AREA(ACRES) = 5.60 SUBAREA RUNOFF(CFS) = 7.20
 EFFECTIVE AREA(ACRES) = 9.20 AREA-AVERAGED Fm(INCH/HR) = 0.29
 AREA-AVERAGED Fp(INCH/HR) = 0.29 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 9.2 PEAK FLOW RATE(CFS) = 11.83

END OF SUBAREA "V" GUTTER HYDRAULICS:

DEPTH(FEET) = 0.25 FLOOD WIDTH(FEET) = 43.96
 FLOW VELOCITY(FEET/SEC.) = 2.39 DEPTH*VELOCITY(FT*FT/SEC) = 0.61
 LONGEST FLOWPATH FROM NODE 509.00 TO NODE 521.00 = 1830.00 FEET.

 FLOW PROCESS FROM NODE 521.00 TO NODE 531.00 IS CODE = 91

>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<

UPSTREAM NODE ELEVATION(FEET) = 3320.00
 DOWNSTREAM NODE ELEVATION(FEET) = 3300.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1090.00
 "V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
 PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
 MAXIMUM DEPTH(FEET) = 5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.504

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL DESERT COVER					
"DESERT BRUSH" (50.0%)	C	10.90	0.29	1.000	85
SUBAREA AVERAGE PEROVIOUS LOSS RATE, Fp(INCH/HR)					
SUBAREA AVERAGE PEROVIOUS AREA FRACTION, Ap					
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)					
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)					
AVERAGE FLOW DEPTH(FEET)					
"V" GUTTER FLOW TRAVEL TIME(MIN.)					
SUBAREA AREA(ACRES)					
EFFECTIVE AREA(ACRES)					
AREA-AVERAGED Fp(INCH/HR)					
TOTAL AREA(ACRES)					
PEAK FLOW RATE(CFS)					

END OF SUBAREA "V" GUTTER HYDRAULICS:

DEPTH(FEET) = 0.31 FLOOD WIDTH(FEET) = 55.05
 FLOW VELOCITY(FEET/SEC.) = 2.85 DEPTH*VELOCITY(FT*FT/SEC) = 0.89
 LONGEST FLOWPATH FROM NODE 509.00 TO NODE 531.00 = 2920.00 FEET.

 FLOW PROCESS FROM NODE 531.00 TO NODE 541.00 IS CODE = 91

>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<

UPSTREAM NODE ELEVATION(FEET) = 3300.00
 DOWNSTREAM NODE ELEVATION(FEET) = 3280.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1190.00

"V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
 PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
 MAXIMUM DEPTH(FEET) = 5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.344
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL DESERT COVER					
"DESERT BRUSH" (50.0%)	C	16.60	0.29	1.000	85
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR)					0.29
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap					1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)					29.80
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)					2.97
AVERAGE FLOW DEPTH(FEET)		0.35	FLOOD WIDTH(FEET)		63.01
"V" GUTTER FLOW TRAVEL TIME(MIN.)		6.68	Tc(MIN.)		45.08
SUBAREA AREA(ACRES)		16.60	SUBAREA RUNOFF(CFS)		15.74
EFFECTIVE AREA(ACRES)		36.70	AREA-AVERAGED Fm(INCH/HR)		0.29
AREA-AVERAGED Fp(INCH/HR)		0.29	AREA-AVERAGED Ap		1.00
TOTAL AREA(ACRES)		36.7	PEAK FLOW RATE(CFS)		34.81

END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) = 0.37 FLOOD WIDTH(FEET) = 66.87
 FLOW VELOCITY(FEET/SEC.) = 3.08 DEPTH*VELOCITY(FT*FT/SEC) = 1.14
 LONGEST FLOWPATH FROM NODE 509.00 TO NODE 541.00 = 4110.00 FEET.

FLOW PROCESS FROM NODE 541.00 TO NODE 551.00 IS CODE = 91

>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<

UPSTREAM NODE ELEVATION(FEET) = 3280.00
 DOWNSTREAM NODE ELEVATION(FEET) = 3265.50
 CHANNEL LENGTH THRU SUBAREA(FEET) = 660.00
 "V" GUTTER WIDTH(FEET) = 5.00 GUTTER HIKE(FEET) = 0.050
 PAVEMENT LIP(FEET) = 0.010 MANNING'S N = .0200
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
 MAXIMUM DEPTH(FEET) = 5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 1.282
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL DESERT COVER					
"DESERT BRUSH" (50.0%)	C	9.10	0.29	1.000	85
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR)					0.29
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap					1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)					38.87
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)					3.49
AVERAGE FLOW DEPTH(FEET)		0.37	FLOOD WIDTH(FEET)		66.39
"V" GUTTER FLOW TRAVEL TIME(MIN.)		3.15	Tc(MIN.)		48.23
SUBAREA AREA(ACRES)		9.10	SUBAREA RUNOFF(CFS)		8.12
EFFECTIVE AREA(ACRES)		45.80	AREA-AVERAGED Fm(INCH/HR)		0.29
AREA-AVERAGED Fp(INCH/HR)		0.29	AREA-AVERAGED Ap		1.00
TOTAL AREA(ACRES)		45.8	PEAK FLOW RATE(CFS)		40.88

END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) = 0.37 FLOOD WIDTH(FEET) = 67.59

FLOW VELOCITY(FEET/SEC.) = 3.54 DEPTH*VELOCITY(FT*FT/SEC) = 1.32
LONGEST FLOWPATH FROM NODE 509.00 TO NODE 551.00 = 4770.00 FEET.

FLOW PROCESS FROM NODE 551.00 TO NODE 10.10 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<

ELEVATION DATA: UPSTREAM(FEET) = 3265.50 DOWNSTREAM(FEET) = 3261.10
FLOW LENGTH(FEET) = 191.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 16.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.30
GIVEN PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.88
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 48.46
LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.10 = 4961.00 FEET.

FLOW PROCESS FROM NODE 10.10 TO NODE 10.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 48.46
RAINFALL INTENSITY(INCH/HR) = 1.28
AREA-AVERAGED Fm(INCH/HR) = 0.29
AREA-AVERAGED Fp(INCH/HR) = 0.29
AREA-AVERAGED Ap = 1.00
EFFECTIVE STREAM AREA(ACRES) = 45.80
TOTAL STREAM AREA(ACRES) = 45.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 40.88

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	40.43	19.98	2.375	0.34(0.32)	0.93	21.5	11.00
1	41.45	42.34	1.404	0.32(0.31)	0.96	41.2	609.00
2	40.88	48.46	1.277	0.29(0.29)	1.00	45.8	509.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	76.02	19.98	2.375	0.32(0.31)	0.96	40.4	11.00
2	81.74	42.34	1.404	0.30(0.30)	0.98	81.2	609.00
3	77.55	48.46	1.277	0.30(0.30)	0.98	87.0	509.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 81.74 Tc(MIN.) = 42.34
EFFECTIVE AREA(ACRES) = 81.23 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 0.98
TOTAL AREA(ACRES) = 87.0

LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.10 = 4961.00 FEET.

FLOW PROCESS FROM NODE 10.10 TO NODE 10.20 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 3253.80 DOWNSTREAM(FEET) = 3247.50
FLOW LENGTH(FEET) = 384.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 24.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.90
GIVEN PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 81.74
PIPE TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 42.80
LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.20 = 5345.00 FEET.

FLOW PROCESS FROM NODE 10.20 TO NODE 10.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 42.80
RAINFALL INTENSITY(INCH/HR) = 1.39
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 0.98
EFFECTIVE STREAM AREA(ACRES) = 81.23
TOTAL STREAM AREA(ACRES) = 87.02
PEAK FLOW RATE(CFS) AT CONFLUENCE = 81.74

FLOW PROCESS FROM NODE 11.30 TO NODE 11.40 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 803.00
ELEVATION DATA: UPSTREAM(FEET) = 3265.40 DOWNSTREAM(FEET) = 3256.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.819
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.928
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	1.82	0.75	0.600	56	14.82
SUBAREA AVERAGE PREVIOUS LOSS RATE, Fp(INCH/HR)			0.75			
SUBAREA AVERAGE PREVIOUS AREA FRACTION, Ap			0.600			
SUBAREA RUNOFF(CFS)		4.06				
TOTAL AREA(ACRES)		1.82	PEAK FLOW RATE(CFS)	= 4.06		

FLOW PROCESS FROM NODE 11.40 TO NODE 11.40 IS CODE = 81

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.82
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.928
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL     AREA      Fp        Ap        SCS
    LAND USE             GROUP (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"3-4 DWELLINGS/ACRE"      B          1.40      0.75      0.600      56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 1.40      SUBAREA RUNOFF(CFS) = 3.12
EFFECTIVE AREA(ACRES) = 3.22      AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.75      AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 3.2      PEAK FLOW RATE(CFS) = 7.18
*****
FLOW PROCESS FROM NODE 11.40 TO NODE 10.20 IS CODE = 41
=====
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 3252.80 DOWNSTREAM(FEET) = 3247.50
FLOW LENGTH(FEET) = 38.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 16.59
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.18
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 14.86
LONGEST FLOWPATH FROM NODE 11.30 TO NODE 10.20 = 841.00 FEET.
*****
FLOW PROCESS FROM NODE 10.20 TO NODE 10.20 IS CODE = 1
=====
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 14.86
RAINFALL INTENSITY(INCH/HR) = 2.92
AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.75
AREA-AVERAGED Ap = 0.60
EFFECTIVE STREAM AREA(ACRES) = 3.22
TOTAL STREAM AREA(ACRES) = 3.22
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.18

** CONFLUENCE DATA **
  STREAM   Q      Tc    Intensity   Fp(Fm)      Ap        Ae        HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR) (DECIMAL) (ACRES)   NODE
    1       76.02  20.45  2.337  0.32( 0.31)  0.96      40.4      11.00
    1       81.74  42.80  1.393  0.30( 0.30)  0.98      81.2      609.00
    1       77.55  48.93  1.269  0.30( 0.30)  0.98      87.0      509.00
    2       7.18   14.86  2.922  0.75( 0.45)  0.60      3.2       11.30

```

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	78.34	14.86	2.922	0.35(0.32)	0.93	32.5	11.30
2	81.50	20.45	2.337	0.34(0.32)	0.93	43.6	11.00
3	84.49	42.80	1.393	0.31(0.30)	0.97	84.5	609.00
4	79.93	48.93	1.269	0.31(0.30)	0.97	90.2	509.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 84.49 Tc(MIN.) = 42.80
EFFECTIVE AREA(ACRES) = 84.45 AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.31 AREA-AVERAGED Ap = 0.97
TOTAL AREA(ACRES) = 90.2
LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.20 = 5345.00 FEET.

FLOW PROCESS FROM NODE 10.20 TO NODE 10.30 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 3247.50 DOWNSTREAM(FEET) = 3245.00
FLOW LENGTH(FEET) = 190.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 27.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.83
GIVEN PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 84.49
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 43.05
LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.30 = 5535.00 FEET.

FLOW PROCESS FROM NODE 10.30 TO NODE 10.30 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 43.05
RAINFALL INTENSITY(INCH/HR) = 1.39
AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) = 0.31
AREA-AVERAGED Ap = 0.97
EFFECTIVE STREAM AREA(ACRES) = 84.45
TOTAL STREAM AREA(ACRES) = 90.24
PEAK FLOW RATE(CFS) AT CONFLUENCE = 84.49

FLOW PROCESS FROM NODE 11.50 TO NODE 11.60 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 340.00
ELEVATION DATA: UPSTREAM(FEET) = 3262.80 DOWNSTREAM(FEET) = 3259.20

$Tc = K * [(LENGTH^{**} 3.00) / (\text{ELEVATION CHANGE})]^{**} 0.20$
 SUBAREA ANALYSIS USED MINIMUM $Tc(\text{MIN.}) = 10.532$
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.718
 SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	1.32	0.75	0.600	56	10.53
SUBAREA AVERAGE PERTVIOUS LOSS RATE, Fp(INCH/HR)						0.75
SUBAREA AVERAGE PERTVIOUS AREA FRACTION, Ap						0.600
SUBAREA RUNOFF(CFS)		3.88				
TOTAL AREA(ACRES)		1.32	PEAK FLOW RATE(CFS)			3.88

FLOW PROCESS FROM NODE 11.60 TO NODE 11.70 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 3259.20 DOWNSTREAM ELEVATION(FEET) = 3255.50
STREET LENGTH(FEET) = 399.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.55
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.45
HALFSTREET FLOOD WIDTH(FEET) = 13.95
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.65
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.18
STREET FLOW TRAVEL TIME(MIN.) = 2.51 $Tc(\text{MIN.}) = 13.04$
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.201
SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.34	0.75	0.600	56
SUBAREA AVERAGE PERTVIOUS LOSS RATE, Fp(INCH/HR)					0.75
SUBAREA AVERAGE PERTVIOUS AREA FRACTION, Ap					0.600
SUBAREA AREA(ACRES)		1.34	SUBAREA RUNOFF(CFS)		3.32
EFFECTIVE AREA(ACRES)		2.66	AREA-AVERAGED Fm(INCH/HR)		0.45
AREA-AVERAGED Fp(INCH/HR)		0.75	AREA-AVERAGED Ap		0.60
TOTAL AREA(ACRES)		2.7	PEAK FLOW RATE(CFS)		6.59

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47 HALFSTREET FLOOD WIDTH(FEET) = 14.96
FLOW VELOCITY(FEET/SEC.) = 2.76 DEPTH*VELOCITY(FT*FT/SEC.) = 1.29
LONGEST FLOWPATH FROM NODE 11.50 TO NODE 11.70 = 739.00 FEET.

```
*****
FLOW PROCESS FROM NODE      11.70 TO NODE      10.30 IS CODE =  41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 3251.50 DOWNSTREAM(FEET) = 3245.00
FLOW LENGTH(FEET) = 22.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.14
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.59
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 13.06
LONGEST FLOWPATH FROM NODE      11.50 TO NODE      10.30 = 761.00 FEET.

*****
FLOW PROCESS FROM NODE      10.30 TO NODE      10.30 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 13.06
RAINFALL INTENSITY(INCH/HR) = 3.20
AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.75
AREA-AVERAGED Ap = 0.60
EFFECTIVE STREAM AREA(ACRES) = 2.66
TOTAL STREAM AREA(ACRES) = 2.66
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.59

** CONFLUENCE DATA **


| STREAM<br>NUMBER | Q<br>(CFS) | Tc<br>(MIN.) | Intensity<br>(INCH/HR) | Fp(Fm)<br>(INCH/HR) | Ap   | Ae<br>(ACRES) | HEADWATER<br>NODE |
|------------------|------------|--------------|------------------------|---------------------|------|---------------|-------------------|
| 1                | 78.34      | 15.11        | 2.888                  | 0.35( 0.32)         | 0.93 | 32.5          | 11.30             |
| 1                | 81.50      | 20.70        | 2.317                  | 0.34( 0.32)         | 0.93 | 43.6          | 11.00             |
| 1                | 84.49      | 43.05        | 1.388                  | 0.31( 0.30)         | 0.97 | 84.5          | 609.00            |
| 1                | 79.93      | 49.18        | 1.264                  | 0.31( 0.30)         | 0.97 | 90.2          | 509.00            |
| 2                | 6.59       | 13.06        | 3.198                  | 0.75( 0.45)         | 0.60 | 2.7           | 11.50             |


RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **


| STREAM<br>NUMBER | Q<br>(CFS) | Tc<br>(MIN.) | Intensity<br>(INCH/HR) | Fp(Fm)<br>(INCH/HR) | Ap   | Ae<br>(ACRES) | HEADWATER<br>NODE |
|------------------|------------|--------------|------------------------|---------------------|------|---------------|-------------------|
| 1                | 82.48      | 13.06        | 3.198                  | 0.37( 0.33)         | 0.90 | 30.8          | 11.50             |
| 2                | 84.19      | 15.11        | 2.888                  | 0.37( 0.33)         | 0.90 | 35.2          | 11.30             |
| 3                | 85.98      | 20.70        | 2.317                  | 0.35( 0.32)         | 0.92 | 46.2          | 11.00             |
| 4                | 86.74      | 43.05        | 1.388                  | 0.32( 0.31)         | 0.96 | 87.1          | 609.00            |
| 5                | 81.89      | 49.18        | 1.264                  | 0.32( 0.31)         | 0.96 | 92.9          | 509.00            |


```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 86.74 Tc(MIN.) = 43.05
 EFFECTIVE AREA(ACRES) = 87.11 AREA-AVERAGED Fm(INCH/HR) = 0.31

AREA-AVERAGED F_p (INCH/HR) = 0.32 AREA-AVERAGED A_p = 0.96
TOTAL AREA(ACRES) = 92.9
LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.30 = 5535.00 FEET.

FLOW PROCESS FROM NODE 10.30 TO NODE 10.40 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<

ELEVATION DATA: UPSTREAM(FEET) = 3245.00 DOWNSTREAM(FEET) = 3243.90

FLOW LENGTH(FEET) = 382.00 MANNING'S N = 0.013

ASSUME FULL-FLOWING PIPELINE

PIPE-FLOW VELOCITY(FEET/SEC.) = 9.02

PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)

GIVEN PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 86.74

PIPE TRAVEL TIME(MIN.) = 0.71 T_c (MIN.) = 43.76

LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.40 = 5917.00 FEET.

FLOW PROCESS FROM NODE 10.40 TO NODE 10.40 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<

FLOW PROCESS FROM NODE 12.00 TO NODE 12.10 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 512.00

ELEVATION DATA: UPSTREAM(FEET) = 3260.70 DOWNSTREAM(FEET) = 3256.60

$T_c = K * [(LENGTH^{**} 3.00) / (ELEVATION CHANGE)]^{**} 0.20$

SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 13.119

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.188

SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
-------------------------------	-------------------	-----------------	--------------------	--------------------	-----------	-----------------

RESIDENTIAL

"3-4 DWELLINGS/ACRE" B 1.43 0.75 0.600 56 13.12

SUBAREA AVERAGE PREVIOUS LOSS RATE, F_p (INCH/HR) = 0.75

SUBAREA AVERAGE PREVIOUS AREA FRACTION, A_p = 0.600

SUBAREA RUNOFF(CFS) = 3.53

TOTAL AREA(ACRES) = 1.43 PEAK FLOW RATE(CFS) = 3.53

FLOW PROCESS FROM NODE 12.10 TO NODE 12.10 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<

MAINLINE T_c (MIN.) = 13.12

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.188

SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
-------------------------------	-------------------	-----------------	--------------------	--------------------	-----------	-----------------

LAND USE	GROUP	(ACRES)	(INCH/HR)	(DECIMAL)	CN
COMMERCIAL	B	0.76	0.75	0.100	56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) =		0.75			
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap =		0.100			
SUBAREA AREA(ACRES) =	0.76	SUBAREA RUNOFF(CFS) =	2.13		
EFFECTIVE AREA(ACRES) =	2.19	AREA-AVERAGED Fm(INCH/HR) =	0.32		
AREA-AVERAGED Fp(INCH/HR) =	0.75	AREA-AVERAGED Ap =	0.43		
TOTAL AREA(ACRES) =	2.2	PEAK FLOW RATE(CFS) =	5.66		

 FLOW PROCESS FROM NODE 12.10 TO NODE 12.50 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<

ELEVATION DATA: UPSTREAM(FEET) =	3252.60	DOWNSTREAM(FEET) =	3251.90
FLOW LENGTH(FEET) =	65.00	MANNING'S N =	0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS	9.3 INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	6.11		
GIVEN PIPE DIAMETER(INCH) =	18.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	5.66		
PIPE TRAVEL TIME(MIN.) =	0.18	Tc(MIN.) =	13.30
LONGEST FLOWPATH FROM NODE 12.00 TO NODE 12.50 =			577.00 FEET.

 FLOW PROCESS FROM NODE 12.50 TO NODE 12.50 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<

TOTAL NUMBER OF STREAMS =	2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:	
TIME OF CONCENTRATION(MIN.) =	13.30
RAINFALL INTENSITY(INCH/HR) =	3.16
AREA-AVERAGED Fm(INCH/HR) =	0.32
AREA-AVERAGED Fp(INCH/HR) =	0.75
AREA-AVERAGED Ap =	0.43
EFFECTIVE STREAM AREA(ACRES) =	2.19
TOTAL STREAM AREA(ACRES) =	2.19
PEAK FLOW RATE(CFS) AT CONFLUENCE =	5.66

 FLOW PROCESS FROM NODE 12.20 TO NODE 12.30 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) =	388.00		
ELEVATION DATA: UPSTREAM(FEET) =	3268.00	DOWNSTREAM(FEET) =	3263.20

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.763

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.662

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	1.41	0.75	0.600	56	10.76

SUBAREA AVERAGE PERVERSIVE LOSS RATE, F_p (INCH/HR) = 0.75
 SUBAREA AVERAGE PERVERSIVE AREA FRACTION, A_p = 0.600
 SUBAREA RUNOFF(CFS) = 4.08
 TOTAL AREA(ACRES) = 1.41 PEAK FLOW RATE(CFS) = 4.08

 FLOW PROCESS FROM NODE 12.30 TO NODE 12.40 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<
 =====
 UPSTREAM ELEVATION(FEET) = 3263.20 DOWNSTREAM ELEVATION(FEET) = 3257.50
 STREET LENGTH(FEET) = 431.00 CURB HEIGHT(INCHES) = 8.0
 STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.16
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.42
 HALFSTREET FLOOD WIDTH(FEET) = 12.62
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.96
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.25
 STREET FLOW TRAVEL TIME(MIN.) = 2.42 T_c (MIN.) = 13.19
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.177
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	0.88	0.75	0.600	56
SUBAREA AVERAGE PERVERSIVE LOSS RATE, F_p (INCH/HR)					
SUBAREA AVERAGE PERVERSIVE AREA FRACTION, A_p					
SUBAREA AREA(ACRES)		0.88	SUBAREA RUNOFF(CFS)		
EFFECTIVE AREA(ACRES)		2.29	AREA-AVERAGED F_m (INCH/HR)		
AREA-AVERAGED F_p (INCH/HR)		0.75	AREA-AVERAGED A_p		
TOTAL AREA(ACRES)		2.3	PEAK FLOW RATE(CFS)		

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 13.09
 FLOW VELOCITY(FEET/SEC.) = 3.02 DEPTH*VELOCITY(FT*FT/SEC.) = 1.30
 LONGEST FLOWPATH FROM NODE 12.20 TO NODE 12.40 = 819.00 FEET.

 FLOW PROCESS FROM NODE 12.40 TO NODE 12.50 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 3253.50 DOWNSTREAM(FEET) = 3251.90
 FLOW LENGTH(FEET) = 56.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.75
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.62
 PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 13.29
 LONGEST FLOWPATH FROM NODE 12.20 TO NODE 12.50 = 875.00 FEET.

 FLOW PROCESS FROM NODE 12.50 TO NODE 12.50 IS CODE = 1

 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
 ======
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 13.29
 RAINFALL INTENSITY(INCH/HR) = 3.16
 AREA-AVERAGED Fm(INCH/HR) = 0.45
 AREA-AVERAGED Fp(INCH/HR) = 0.75
 AREA-AVERAGED Ap = 0.60
 EFFECTIVE STREAM AREA(ACRES) = 2.29
 TOTAL STREAM AREA(ACRES) = 2.29
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.62

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.66	13.30	3.159	0.75(0.32)	0.43	2.2	12.00
2	5.62	13.29	3.159	0.75(0.45)	0.60	2.3	12.20

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	11.28	13.29	3.159	0.75(0.39)	0.52	4.5	12.20
2	11.28	13.30	3.159	0.75(0.39)	0.52	4.5	12.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 11.28 Tc(MIN.) = 13.29
 EFFECTIVE AREA(ACRES) = 4.48 AREA-AVERAGED Fm(INCH/HR) = 0.39
 AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.52
 TOTAL AREA(ACRES) = 4.5
 LONGEST FLOWPATH FROM NODE 12.20 TO NODE 12.50 = 875.00 FEET.

 FLOW PROCESS FROM NODE 12.50 TO NODE 12.60 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
 ======
 ELEVATION DATA: UPSTREAM(FEET) = 3251.90 DOWNSTREAM(FEET) = 3244.60
 FLOW LENGTH(FEET) = 449.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.31
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 11.28
PIPE TRAVEL TIME(MIN.) = 0.90 Tc(MIN.) = 14.19
LONGEST FLOWPATH FROM NODE 12.20 TO NODE 12.60 = 1324.00 FEET.

FLOW PROCESS FROM NODE 12.60 TO NODE 12.60 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 14.19
RAINFALL INTENSITY(INCH/HR) = 3.02
AREA-AVERAGED Fm(INCH/HR) = 0.39
AREA-AVERAGED Fp(INCH/HR) = 0.75
AREA-AVERAGED Ap = 0.52
EFFECTIVE STREAM AREA(ACRES) = 4.48
TOTAL STREAM AREA(ACRES) = 4.48
PEAK FLOW RATE(CFS) AT CONFLUENCE = 11.28

FLOW PROCESS FROM NODE 11.70 TO NODE 11.80 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

INITIAL SUBAREA FLOW-LENGTH(FEET) = 588.00
ELEVATION DATA: UPSTREAM(FEET) = 3260.40 DOWNSTREAM(FEET) = 3256.10

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.120
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.028

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "3-4 DWELLINGS/ACRE"	B	1.36	0.75	0.600	56	14.12
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR)				0.75		
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap				0.600		
SUBAREA RUNOFF(CFS)		3.16				
TOTAL AREA(ACRES)		1.36	PEAK FLOW RATE(CFS)			3.16

FLOW PROCESS FROM NODE 11.80 TO NODE 11.90 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 3256.10 DOWNSTREAM ELEVATION(FEET) = 3252.30
STREET LENGTH(FEET) = 402.00 CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.18
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.42
 HALFSTREET FLOOD WIDTH(FEET) = 12.38
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.48
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.03
 STREET FLOW TRAVEL TIME(MIN.) = 2.70 Tc(MIN.) = 16.82
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.680
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	1.02	0.75	0.600	56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR)					
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap					
SUBAREA AREA(ACRES)		1.02	SUBAREA RUNOFF(CFS)		2.05
EFFECTIVE AREA(ACRES)		2.38	AREA-AVERAGED Fm(INCH/HR)		0.45
AREA-AVERAGED Fp(INCH/HR)		0.75	AREA-AVERAGED Ap		0.60
TOTAL AREA(ACRES)		2.4	PEAK FLOW RATE(CFS)		4.78

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 13.09
 FLOW VELOCITY(FEET/SEC.) = 2.57 DEPTH*VELOCITY(FT*FT/SEC.) = 1.10
 LONGEST FLOWPATH FROM NODE 11.70 TO NODE 11.90 = 990.00 FEET.

 FLOW PROCESS FROM NODE 11.90 TO NODE 11.90 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
 ======
 MAINLINE Tc(MIN.) = 16.82
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.680
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	2.41	0.75	0.600	56
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR)					
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap					
SUBAREA AREA(ACRES)		2.41	SUBAREA RUNOFF(CFS)		4.84
EFFECTIVE AREA(ACRES)		4.79	AREA-AVERAGED Fm(INCH/HR)		0.45
AREA-AVERAGED Fp(INCH/HR)		0.75	AREA-AVERAGED Ap		0.60
TOTAL AREA(ACRES)		4.8	PEAK FLOW RATE(CFS)		9.62

 FLOW PROCESS FROM NODE 11.90 TO NODE 12.60 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
 ======
 ELEVATION DATA: UPSTREAM(FEET) = 3248.30 DOWNSTREAM(FEET) = 3244.60
 FLOW LENGTH(FEET) = 24.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.0 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 18.68
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 9.62
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 16.84
 LONGEST FLOWPATH FROM NODE 11.70 TO NODE 12.60 = 1014.00 FEET.

FLOW PROCESS FROM NODE 12.60 TO NODE 12.60 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 16.84
 RAINFALL INTENSITY(INCH/HR) = 2.68
 AREA-AVERAGED Fm(INCH/HR) = 0.45
 AREA-AVERAGED Fp(INCH/HR) = 0.75
 AREA-AVERAGED Ap = 0.60
 EFFECTIVE STREAM AREA(ACRES) = 4.79
 TOTAL STREAM AREA(ACRES) = 4.79
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.62

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	11.28	14.19	3.017	0.75(0.39)	0.52	4.5	12.20
1	11.28	14.20	3.017	0.75(0.39)	0.52	4.5	12.00
2	9.62	16.84	2.677	0.75(0.45)	0.60	4.8	11.70

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	20.62	14.19	3.017	0.75(0.42)	0.56	8.5	12.20
2	20.62	14.20	3.017	0.75(0.42)	0.56	8.5	12.00
3	19.44	16.84	2.677	0.75(0.42)	0.56	9.3	11.70

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 20.62 Tc(MIN.) = 14.19
 EFFECTIVE AREA(ACRES) = 8.52 AREA-AVERAGED Fm(INCH/HR) = 0.42
 AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.56
 TOTAL AREA(ACRES) = 9.3

LONGEST FLOWPATH FROM NODE 12.20 TO NODE 12.60 = 1324.00 FEET.

FLOW PROCESS FROM NODE 12.60 TO NODE 10.40 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 3244.60 DOWNSTREAM(FEET) = 3243.90
 FLOW LENGTH(FEET) = 44.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.69

GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 20.62
 PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 14.27
 LONGEST FLOWPATH FROM NODE 12.20 TO NODE 10.40 = 1368.00 FEET.

FLOW PROCESS FROM NODE 10.40 TO NODE 10.40 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<
 =====

** MAIN STREAM CONFLUENCE DATA **
 STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
 NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
 1 20.62 14.27 3.006 0.75(0.42) 0.56 8.5 12.20
 2 20.62 14.27 3.006 0.75(0.42) 0.56 8.5 12.00
 3 19.44 16.91 2.669 0.75(0.42) 0.56 9.3 11.70
 LONGEST FLOWPATH FROM NODE 12.20 TO NODE 10.40 = 1368.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **
 STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
 NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
 1 82.48 13.80 3.077 0.37(0.33) 0.90 30.8 11.50
 2 84.19 15.84 2.795 0.37(0.33) 0.90 35.2 11.30
 3 85.98 21.41 2.263 0.35(0.32) 0.92 46.2 11.00
 4 86.74 43.76 1.372 0.32(0.31) 0.96 87.1 609.00
 5 81.89 49.93 1.251 0.32(0.31) 0.96 92.9 509.00
 LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.40 = 5917.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM Q Tc Intensity Fp(Fm) Ap Ae HEADWATER
 NUMBER (CFS) (MIN.) (INCH/HR) (INCH/HR) (ACRES) NODE
 1 102.98 13.80 3.077 0.42(0.35) 0.83 39.0 11.50
 2 103.50 14.27 3.006 0.42(0.35) 0.83 40.3 12.20
 3 103.50 14.27 3.006 0.42(0.35) 0.83 40.3 12.00
 4 104.11 15.84 2.795 0.42(0.35) 0.83 44.2 11.30
 5 103.97 16.91 2.669 0.41(0.35) 0.84 46.6 11.70
 6 101.92 21.41 2.263 0.40(0.34) 0.86 55.5 11.00
 7 94.98 43.76 1.372 0.35(0.32) 0.92 96.4 609.00
 8 89.08 49.93 1.251 0.34(0.32) 0.92 102.2 509.00
 TOTAL AREA(ACRES) = 102.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 104.11 Tc(MIN.) = 15.836
 EFFECTIVE AREA(ACRES) = 44.17 AREA-AVERAGED Fm(INCH/HR) = 0.35
 AREA-AVERAGED Fp(INCH/HR) = 0.41 AREA-AVERAGED Ap = 0.84
 TOTAL AREA(ACRES) = 102.2
 LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.40 = 5917.00 FEET.

FLOW PROCESS FROM NODE 10.40 TO NODE 10.50 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 3243.90 DOWNSTREAM(FEET) = 3242.40
 FLOW LENGTH(FEET) = 247.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.88
 GIVEN PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 104.11
 PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 16.25
 LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.50 = 6164.00 FEET.

FLOW PROCESS FROM NODE 10.50 TO NODE 10.50 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 16.25
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.744
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	2.74	0.75	0.600	56

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 2.74 SUBAREA RUNOFF(CFS) = 5.66
 EFFECTIVE AREA(ACRES) = 46.91 AREA-AVERAGED Fm(INCH/HR) = 0.35
 AREA-AVERAGED Fp(INCH/HR) = 0.43 AREA-AVERAGED Ap = 0.82
 TOTAL AREA(ACRES) = 104.9 PEAK FLOW RATE(CFS) = 104.11
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 10.50 TO NODE 10.60 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 3242.40 DOWNSTREAM(FEET) = 3241.80
 FLOW LENGTH(FEET) = 99.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 37.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.87
 GIVEN PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 104.11
 PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 16.42
 LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.60 = 6263.00 FEET.

FLOW PROCESS FROM NODE 10.60 TO NODE 10.60 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

MAINLINE Tc(MIN.) = 16.42
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.725
 SUBAREA LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL					
"3-4 DWELLINGS/ACRE"	B	3.51	0.75	0.600	56

 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
 SUBAREA AREA(ACRES) = 3.51 SUBAREA RUNOFF(CFS) = 7.19

EFFECTIVE AREA(ACRES) =	50.42	AREA-AVERAGED Fm(INCH/HR) =	0.36
AREA-AVERAGED Fp(INCH/HR) =	0.45	AREA-AVERAGED Ap =	0.80
TOTAL AREA(ACRES) =	108.4	PEAK FLOW RATE(CFS) =	107.31

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	107.03	14.39	2.989	0.46(0.36)	0.79	45.3	11.50
2	107.34	14.85	2.923	0.45(0.36)	0.80	46.6	12.20
3	107.35	14.86	2.923	0.45(0.36)	0.80	46.6	12.00
4	107.31	16.42	2.725	0.45(0.36)	0.80	50.4	11.30
5	106.94	17.50	2.606	0.44(0.36)	0.81	52.9	11.70
6	103.95	21.99	2.221	0.42(0.35)	0.83	61.8	11.00
7	95.41	44.35	1.359	0.36(0.33)	0.90	102.6	609.00
8	89.40	50.52	1.241	0.36(0.32)	0.90	108.4	509.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) =	107.35	Tc(MIN.) =	14.86
AREA-AVERAGED Fm(INCH/HR) =	0.36	AREA-AVERAGED Fp(INCH/HR) =	0.45
AREA-AVERAGED Ap =	0.80	EFFECTIVE AREA(ACRES) =	46.58

FLOW PROCESS FROM NODE 10.60 TO NODE 10.70 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 3241.80 DOWNSTREAM(FEET) = 3238.80

FLOW LENGTH(FEET) = 62.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 48.0 INCH PIPE IS 19.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 22.31

GIVEN PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 107.35

PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 14.90

LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.70 = 6325.00 FEET.

FLOW PROCESS FROM NODE 10.70 TO NODE 10.70 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<

FLOW PROCESS FROM NODE 13.00 TO NODE 13.10 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 553.00

ELEVATION DATA: UPSTREAM(FEET) = 3257.60 DOWNSTREAM(FEET) = 3249.30

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.804

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.215

SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	B	0.88	0.75	0.100	56	8.80

SUBAREA AVERAGE PERVERSIVE LOSS RATE, F_p (INCH/HR) = 0.75
 SUBAREA AVERAGE PERVERSIVE AREA FRACTION, A_p = 0.100
 SUBAREA RUNOFF(CFS) = 3.28
 TOTAL AREA(ACRES) = 0.88 PEAK FLOW RATE(CFS) = 3.28

FLOW PROCESS FROM NODE 13.10 TO NODE 13.20 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<
 ======
 ELEVATION DATA: UPSTREAM(FEET) = 3245.10 DOWNSTREAM(FEET) = 3242.40
 FLOW LENGTH(FEET) = 336.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.76
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.28
 PIPE TRAVEL TIME(MIN.) = 1.18 T_c (MIN.) = 9.98
 LONGEST FLOWPATH FROM NODE 13.00 TO NODE 13.20 = 889.00 FEET.

FLOW PROCESS FROM NODE 13.20 TO NODE 13.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<
 ======
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.98
 RAINFALL INTENSITY(INCH/HR) = 3.86
 AREA-AVERAGED F_m (INCH/HR) = 0.07
 AREA-AVERAGED F_p (INCH/HR) = 0.75
 AREA-AVERAGED A_p = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 0.88
 TOTAL STREAM AREA(ACRES) = 0.88
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.28

FLOW PROCESS FROM NODE 14.00 TO NODE 14.10 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ======
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 461.00
 ELEVATION DATA: UPSTREAM(FEET) = 3259.90 DOWNSTREAM(FEET) = 3254.20

$T_c = K * [(\text{LENGTH}^{** 3.00}) / (\text{ELEVATION CHANGE})]^{** 0.20}$
 SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 11.533
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.489
 SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	1.27	0.75	0.600	56	11.53
SUBAREA AVERAGE PERVERSIVE LOSS RATE, F_p (INCH/HR)						
SUBAREA AVERAGE PERVERSIVE AREA FRACTION, A_p						
SUBAREA RUNOFF(CFS)		3.48				
TOTAL AREA(ACRES)		1.27	PEAK FLOW RATE(CFS)			3.48

```
*****
FLOW PROCESS FROM NODE      14.10 TO NODE      14.20 IS CODE =  62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION #  1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) = 3254.20  DOWNSTREAM ELEVATION(FEET) = 3253.00
STREET LENGTH(FEET) = 346.00    CURB HEIGHT(INCHES) = 8.0
STREET HALFWIDTH(FEET) = 30.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.06
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.50
HALFSTREET FLOOD WIDTH(FEET) = 16.45
AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.77
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.88
STREET FLOW TRAVEL TIME(MIN.) = 3.25   Tc(MIN.) = 14.79
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.932
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
  LAND USE             GROUP      (ACRES)    (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"3-4 DWELLINGS/ACRE"      B          1.41      0.75      0.600      56
SUBAREA AVERAGE PEROVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PEROVIOUS AREA FRACTION, AP = 0.600
SUBAREA AREA(ACRES) = 1.41      SUBAREA RUNOFF(CFS) = 3.15
EFFECTIVE AREA(ACRES) = 2.68      AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.75      AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 2.7      PEAK FLOW RATE(CFS) = 5.99

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.52  HALFSTREET FLOOD WIDTH(FEET) = 17.54
FLOW VELOCITY(FEET/SEC.) = 1.86  DEPTH*VELOCITY(FT*FT/SEC.) = 0.96
LONGEST FLOWPATH FROM NODE      14.00 TO NODE      14.20 = 807.00 FEET.

*****
FLOW PROCESS FROM NODE      14.20 TO NODE      13.20 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 3247.00  DOWNSTREAM(FEET) = 3242.40
FLOW LENGTH(FEET) = 33.00  MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.75
GIVEN PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.99
```

PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 14.82
LONGEST FLOWPATH FROM NODE 14.00 TO NODE 13.20 = 840.00 FEET.

FLOW PROCESS FROM NODE 13.20 TO NODE 13.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 14.82
RAINFALL INTENSITY(INCH/HR) = 2.93
AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.75
AREA-AVERAGED Ap = 0.60
EFFECTIVE STREAM AREA(ACRES) = 2.68
TOTAL STREAM AREA(ACRES) = 2.68
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.99

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.28	9.98	3.861	0.75(0.07)	0.10	0.9	13.00
2	5.99	14.82	2.927	0.75(0.45)	0.60	2.7	14.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.83	9.98	3.861	0.75(0.33)	0.44	2.7	13.00
2	8.46	14.82	2.927	0.75(0.36)	0.48	3.6	14.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 8.83 Tc(MIN.) = 9.98
EFFECTIVE AREA(ACRES) = 2.68 AREA-AVERAGED Fm(INCH/HR) = 0.33
AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.44
TOTAL AREA(ACRES) = 3.6
LONGEST FLOWPATH FROM NODE 13.00 TO NODE 13.20 = 889.00 FEET.

FLOW PROCESS FROM NODE 13.20 TO NODE 13.30 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 3242.40 DOWNSTREAM(FEET) = 3240.20

FLOW LENGTH(FEET) = 438.00 MANNING'S N = 0.013

ASSUME FULL-FLOWING PIPELINE

PIPE-FLOW VELOCITY(FEET/SEC.) = 5.00

PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)

GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 8.83

PIPE TRAVEL TIME(MIN.) = 1.46 Tc(MIN.) = 11.44

LONGEST FLOWPATH FROM NODE 13.00 TO NODE 13.30 = 1327.00 FEET.

```
*****
FLOW PROCESS FROM NODE      13.30 TO NODE      13.30 IS CODE =    1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) =   11.44
RAINFALL INTENSITY(INCH/HR) =   3.51
AREA-AVERAGED Fm(INCH/HR) =   0.33
AREA-AVERAGED Fp(INCH/HR) =   0.75
AREA-AVERAGED Ap =   0.44
EFFECTIVE STREAM AREA(ACRES) =       2.68
TOTAL STREAM AREA(ACRES) =       3.56
PEAK FLOW RATE(CFS) AT CONFLUENCE =     8.83

*****
FLOW PROCESS FROM NODE      15.00 TO NODE      15.10 IS CODE =  21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =   640.00
ELEVATION DATA: UPSTREAM(FEET) = 3257.40 DOWNSTREAM(FEET) = 3256.40

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   19.889
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =   2.383
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS      Tc
  LAND USE             GROUP      (ACRES) (INCH/HR) (DECIMAL) CN      (MIN.)
RESIDENTIAL
"3-4 DWELLINGS/ACRE"      B          2.15      0.75      0.600      56      19.89
SUBAREA AVERAGE PREVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PREVIOUS AREA FRACTION, Ap = 0.600
SUBAREA RUNOFF(CFS) =     3.74
TOTAL AREA(ACRES) =       2.15      PEAK FLOW RATE(CFS) =     3.74

*****
FLOW PROCESS FROM NODE      15.10 TO NODE      15.10 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) =   19.89
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =   2.383
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS
  LAND USE             GROUP      (ACRES) (INCH/HR) (DECIMAL) CN
RESIDENTIAL
"3-4 DWELLINGS/ACRE"      B          1.61      0.75      0.600      56
SUBAREA AVERAGE PREVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PREVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) =     1.61      SUBAREA RUNOFF(CFS) =     2.80
EFFECTIVE AREA(ACRES) =     3.76      AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.75      AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) =       3.8      PEAK FLOW RATE(CFS) =     6.54
```

```

*****
FLOW PROCESS FROM NODE      15.10 TO NODE      13.30 IS CODE =  41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 3251.10 DOWNSTREAM(FEET) = 3240.20
FLOW LENGTH(FEET) = 296.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.00
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 6.54
PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 20.38
LONGEST FLOWPATH FROM NODE      15.00 TO NODE      13.30 = 936.00 FEET.

*****
FLOW PROCESS FROM NODE      13.30 TO NODE      13.30 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 20.38
RAINFALL INTENSITY(INCH/HR) = 2.34
AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.75
AREA-AVERAGED Ap = 0.60
EFFECTIVE STREAM AREA(ACRES) = 3.76
TOTAL STREAM AREA(ACRES) = 3.76
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.54

** CONFLUENCE DATA **
STREAM      Q      Tc      Intensity      Fp(Fm)      Ap      Ae      HEADWATER
NUMBER     (CFS)   (MIN.)   (INCH/HR)   (INCH/HR)   (ACRES)   NODE
      1       8.83    11.44     3.509    0.75( 0.33)  0.44        2.7      13.00
      1       8.46    16.35     2.733    0.75( 0.36)  0.48        3.6      14.00
      2       6.54    20.38     2.342    0.75( 0.45)  0.60        3.8      15.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc      Intensity      Fp(Fm)      Ap      Ae      HEADWATER
NUMBER     (CFS)   (MIN.)   (INCH/HR)   (INCH/HR)   (ACRES)   NODE
      1       14.77   11.44     3.509    0.75( 0.38)  0.51        4.8      13.00
      2       14.79   16.35     2.733    0.75( 0.40)  0.53        6.6      14.00
      3       13.61   20.38     2.342    0.75( 0.40)  0.54        7.3      15.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 14.79 Tc(MIN.) = 16.35
EFFECTIVE AREA(ACRES) = 6.58 AREA-AVERAGED Fm(INCH/HR) = 0.40
AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.53
TOTAL AREA(ACRES) = 7.3
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      13.30 = 1327.00 FEET.

```

```
*****
FLOW PROCESS FROM NODE      13.30 TO NODE      13.40 IS CODE =  41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 3240.20 DOWNSTREAM(FEET) = 3239.40
FLOW LENGTH(FEET) = 170.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 19.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.49
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.79
PIPE TRAVEL TIME(MIN.) = 0.52 Tc(MIN.) = 16.86
LONGEST FLOWPATH FROM NODE      13.00 TO NODE      13.40 = 1497.00 FEET.

*****
FLOW PROCESS FROM NODE      13.40 TO NODE      13.40 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 16.86
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.674
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/          SCS SOIL     AREA      Fp        Ap       SCS
    LAND USE                 GROUP      (ACRES)   (INCH/HR)   (DECIMAL) CN
RESIDENTIAL
  "3-4 DWELLINGS/ACRE"      B           2.42      0.75      0.600      56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA AREA(ACRES) = 2.42 SUBAREA RUNOFF(CFS) = 4.85
EFFECTIVE AREA(ACRES) = 9.00 AREA-AVERAGED Fm(INCH/HR) = 0.41
AREA-AVERAGED Fp(INCH/HR) = 0.75 AREA-AVERAGED Ap = 0.55
TOTAL AREA(ACRES) = 9.7 PEAK FLOW RATE(CFS) = 18.32

** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc    Intensity    Fp(Fm)      Ap      Ae    HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)   NODE
    1         19.47  11.96    3.402  0.75( 0.40)  0.54      7.2    13.00
    2         18.32  16.86    2.674  0.75( 0.41)  0.55      9.0    14.00
    3         16.53  20.90    2.301  0.75( 0.42)  0.55      9.7    15.00
NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) = 19.47 Tc(MIN.) = 11.96
AREA-AVERAGED Fm(INCH/HR) = 0.40 AREA-AVERAGED Fp(INCH/HR) = 0.75
AREA-AVERAGED Ap = 0.54 EFFECTIVE AREA(ACRES) = 7.21

*****
FLOW PROCESS FROM NODE      13.40 TO NODE      10.70 IS CODE = 41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 3239.40 DOWNSTREAM(FEET) = 3238.80
FLOW LENGTH(FEET) = 72.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 19.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.30
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.47
```

PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 12.12
 LONGEST FLOWPATH FROM NODE 13.00 TO NODE 10.70 = 1569.00 FEET.

 FLOW PROCESS FROM NODE 10.70 TO NODE 10.70 IS CODE = 11

 >>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<
 =====

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	19.47	12.12	3.370	0.75(0.40)	0.54	7.2	13.00
2	18.32	17.03	2.656	0.75(0.41)	0.55	9.0	14.00
3	16.53	21.07	2.288	0.75(0.42)	0.55	9.7	15.00
LONGEST FLOWPATH FROM NODE				13.00 TO NODE	10.70	=	1569.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	107.03	14.43	2.982	0.46(0.36)	0.79	45.3	11.50
2	107.34	14.90	2.917	0.45(0.36)	0.80	46.6	12.20
3	107.35	14.90	2.916	0.45(0.36)	0.80	46.6	12.00
4	107.31	16.47	2.720	0.45(0.36)	0.80	50.4	11.30
5	106.94	17.54	2.601	0.44(0.36)	0.81	52.9	11.70
6	103.95	22.04	2.217	0.42(0.35)	0.83	61.8	11.00
7	95.41	44.39	1.358	0.36(0.33)	0.90	102.6	609.00
8	89.40	50.57	1.240	0.36(0.32)	0.90	108.4	509.00
LONGEST FLOWPATH FROM NODE				509.00 TO NODE	10.70	=	6325.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	122.66	12.12	3.370	0.49(0.37)	0.75	45.2	13.00
2	125.96	14.43	2.982	0.49(0.37)	0.76	53.3	11.50
3	126.16	14.90	2.917	0.49(0.37)	0.76	54.8	12.20
4	126.16	14.90	2.916	0.49(0.37)	0.76	54.8	12.00
5	125.76	16.47	2.720	0.48(0.37)	0.76	59.2	11.30
6	125.43	17.03	2.656	0.48(0.37)	0.77	60.7	14.00
7	125.02	17.54	2.601	0.48(0.37)	0.77	61.9	11.70
8	121.13	21.07	2.288	0.46(0.36)	0.79	69.6	15.00
9	119.85	22.04	2.217	0.45(0.36)	0.79	71.5	11.00
10	103.73	44.39	1.358	0.38(0.33)	0.87	112.4	609.00
11	96.68	50.57	1.240	0.38(0.33)	0.87	118.2	509.00
TOTAL AREA(ACRES) =				118.2			

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 126.16 Tc(MIN.) = 14.902
 EFFECTIVE AREA(ACRES) = 54.80 AREA-AVERAGED Fm(INCH/HR) = 0.37
 AREA-AVERAGED Fp(INCH/HR) = 0.48 AREA-AVERAGED Ap = 0.77
 TOTAL AREA(ACRES) = 118.2
 LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.70 = 6325.00 FEET.

 FLOW PROCESS FROM NODE 10.70 TO NODE 10.80 IS CODE = 41

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

```

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 3238.80 DOWNSTREAM(FEET) = 3236.90
FLOW LENGTH(FEET) = 47.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 22.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.79
GIVEN PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 126.16
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 14.94
LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.80 = 6372.00 FEET.

*****
FLOW PROCESS FROM NODE 10.80 TO NODE 10.80 IS CODE = 81
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.94
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.911
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE        GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL          B      0.78   0.75   0.100 56
COMMERCIAL          B      0.85   0.75   0.100 56
RESIDENTIAL
"3-4 DWELLINGS/ACRE" B      2.11   0.75   0.600 56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.382
SUBAREA AREA(ACRES) = 3.74     SUBAREA RUNOFF(CFS) = 8.84
EFFECTIVE AREA(ACRES) = 58.54     AREA-AVERAGED Fm(INCH/HR) = 0.36
AREA-AVERAGED Fp(INCH/HR) = 0.50     AREA-AVERAGED Ap = 0.73
TOTAL AREA(ACRES) = 121.9     PEAK FLOW RATE(CFS) = 134.24

*****
FLOW PROCESS FROM NODE 10.80 TO NODE 10.90 IS CODE = 41
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 3236.90 DOWNSTREAM(FEET) = 3236.00
FLOW LENGTH(FEET) = 17.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 21.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 24.47
GIVEN PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 134.24
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 14.95
LONGEST FLOWPATH FROM NODE 509.00 TO NODE 10.90 = 6389.00 FEET.

*****
FLOW PROCESS FROM NODE 10.90 TO NODE 10.90 IS CODE = 81
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
MAINLINE Tc(MIN.) = 14.95
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.910
SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
    LAND USE        GROUP (ACRES) (INCH/HR) (DECIMAL) CN

```

NATURAL POOR COVER

"BARREN" B 1.34 0.27 1.000 86
SUBAREA AVERAGE PERVERSUS LOSS RATE, F_p (INCH/HR) = 0.27
SUBAREA AVERAGE PERVERSUS AREA FRACTION, A_p = 1.000
SUBAREA AREA(ACRES) = 1.34 SUBAREA RUNOFF(CFS) = 3.18
EFFECTIVE AREA(ACRES) = 59.88 AREA-AVERAGED F_m (INCH/HR) = 0.36
AREA-AVERAGED F_p (INCH/HR) = 0.49 AREA-AVERAGED A_e = 0.74
TOTAL AREA(ACRES) = 123.2 PEAK FLOW RATE(CFS) = 137.33

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	F_p (Fm) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	135.89	12.17	3.361	0.49(0.36)	0.73	50.3	13.00
2	137.41	14.48	2.975	0.49(0.36)	0.74	58.4	11.50
3	137.34	14.95	2.910	0.49(0.36)	0.74	59.9	12.20
4	137.33	14.95	2.910	0.49(0.36)	0.74	59.9	12.00
5	136.16	16.51	2.714	0.48(0.36)	0.75	64.3	11.30
6	135.59	17.08	2.651	0.48(0.36)	0.75	65.8	14.00
7	134.92	17.59	2.596	0.48(0.36)	0.75	67.0	11.70
8	129.61	21.12	2.285	0.46(0.36)	0.77	74.7	15.00
9	128.18	22.09	2.214	0.46(0.35)	0.78	76.6	11.00
10	108.39	44.44	1.357	0.39(0.33)	0.85	117.5	609.00
11	100.83	50.62	1.239	0.38(0.33)	0.86	123.2	509.00

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 137.41 Tc(MIN.) = 14.48
AREA-AVERAGED F_m (INCH/HR) = 0.36 AREA-AVERAGED F_p (INCH/HR) = 0.49
AREA-AVERAGED A_p = 0.74 EFFECTIVE AREA(ACRES) = 58.41

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 123.2 TC(MIN.) = 14.48
EFFECTIVE AREA(ACRES) = 58.41 AREA-AVERAGED F_m (INCH/HR) = 0.36
AREA-AVERAGED F_p (INCH/HR) = 0.49 AREA-AVERAGED A_p = 0.738
PEAK FLOW RATE(CFS) = 137.41

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	F_p (Fm) (INCH/HR)	A_p	A_e (ACRES)	HEADWATER NODE
1	135.89	12.17	3.361	0.49(0.36)	0.73	50.3	13.00
2	137.41	14.48	2.975	0.49(0.36)	0.74	58.4	11.50
3	137.34	14.95	2.910	0.49(0.36)	0.74	59.9	12.20
4	137.33	14.95	2.910	0.49(0.36)	0.74	59.9	12.00
5	136.16	16.51	2.714	0.48(0.36)	0.75	64.3	11.30
6	135.59	17.08	2.651	0.48(0.36)	0.75	65.8	14.00
7	134.92	17.59	2.596	0.48(0.36)	0.75	67.0	11.70
8	129.61	21.12	2.285	0.46(0.36)	0.77	74.7	15.00
9	128.18	22.09	2.214	0.46(0.35)	0.78	76.6	11.00
10	108.39	44.44	1.357	0.39(0.33)	0.85	117.5	609.00
11	100.83	50.62	1.239	0.38(0.33)	0.86	123.2	509.00

=====

=====

END OF RATIONAL METHOD ANALYSIS

SECTION B-3
DETENTION BASIN FLOOD ROUTING
ANALYSIS

TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

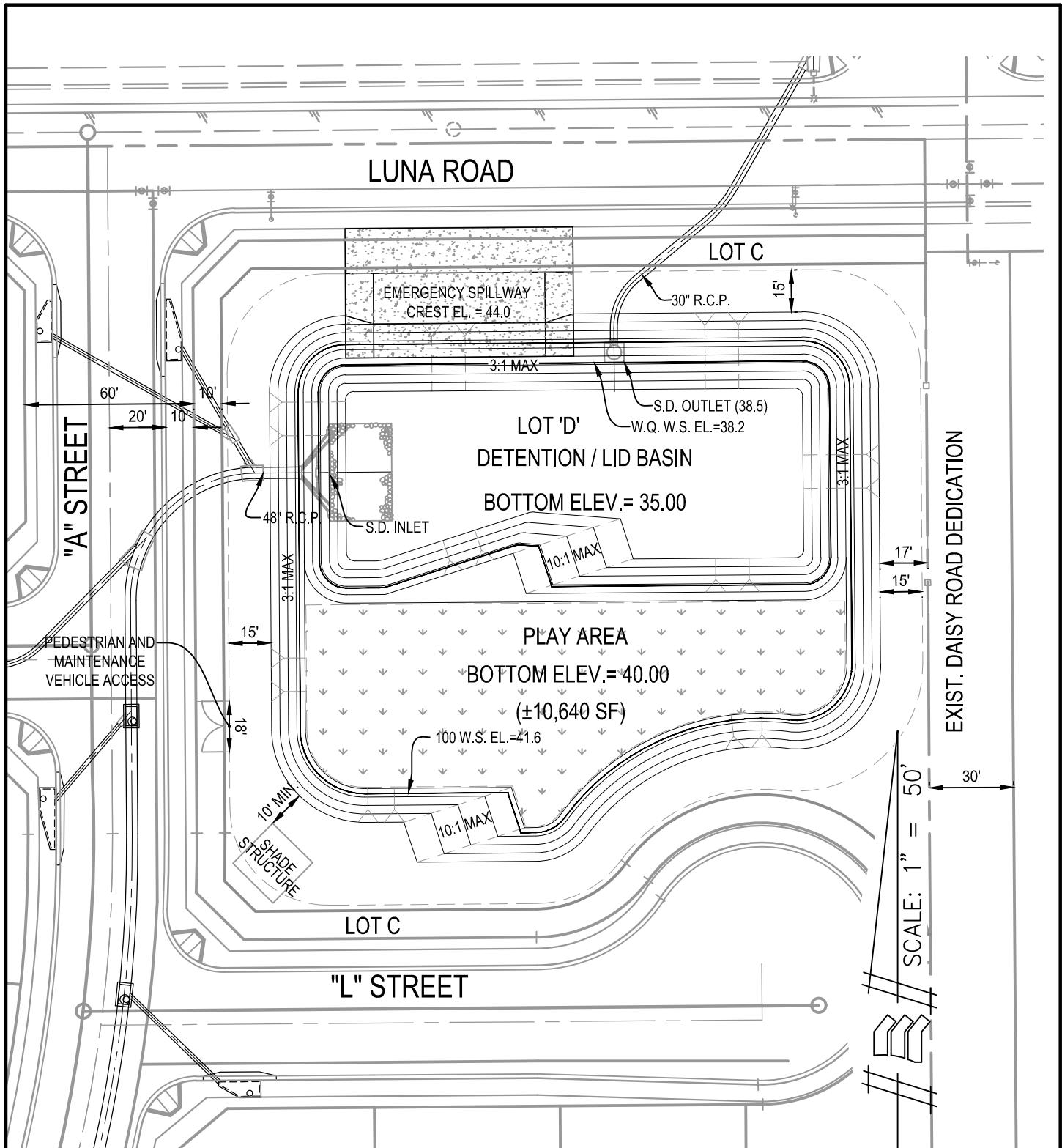


FIGURE 6



9302 PITTSBURGH AVE, SUITE 230
RANCHO CUCAMONGA, CA. 91730
PHONE: 909.481.6322
FAX: 909.481.6320

DETENTION/WQMP BASIN EXHIBIT

TENTATIVE TRACT No. 20275

IN THE CITY OF VICTORVILLE, CA.

UNIT HYDROGRAPH INPUT

INFORMATION

TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

WATERSHED AREA-AVERAGED POINT RAINFALL DATA
INPUT FOR UNIT HYDROGRAPH
(Table 3-c)

100-YEAR DEVELOPED

5-Minute Point Rainfall	inches	<u>0.34</u>
30-Minute Point Rainfall	inches	<u>0.79</u>
1-Hour Point Rainfall	inches	<u>1.10</u>
3-Hour Point Rainfall	inches	<u>1.49</u>
6-Hour Point Rainfall	inches	<u>1.80</u>
24-Hour Point Rainfall	inches	<u>3.00</u>

**MADOLE & ASSOCIATES, INC.**

Civil Engineers-Land Surveyors-Planners
9302 Pittsburgh Avenue, Suite
Rancho Cucamonga, CA 91730
(909) 481-6322 fax 481-6320

Job TTM 20275 652-2039
Sheet No. _____ of _____
Calculated by: TGS Date 4/30/2019
Checked by: _____ Date _____
Scale _____ nts _____

Rainfall Intensity Data**TABLE 3-a**

Slope of Intensity/Duration curve

0.7

Duration hr	Return Period (year)					
	1	2	5	10	25	100
1	0.40	0.51	0.64	0.75	0.89	1.1
3	0.49	0.62	0.82	0.97	1.18	1.49
6	0.51	0.7	0.96	1.15	1.41	1.8
24	0.70	1.05	1.51	1.85	2.31	3

slope 0.14 0.18 0.23 0.24 0.26 0.27

[Yellow Box] =values taken from Isohyetals, County Hydrology Manual

All other values "interpolated" using logarithmic equations as follows:

$$\rightarrow \text{Exp} (+/- \text{ Slope} \times \ln(T \text{ des}) + \ln(\text{ref I}) -/+ \text{ Slope} \times \ln(\text{ref T}))$$

$$\rightarrow I_{100} - I_{10} / \ln(100/10) \times \ln(\text{des Period} / 10) + I_{10}$$

TTM 20275

652-2039

4/30/2019

Low Loss Fraction & Maximum Loss Rate

100-year Developed

Set #

6

Cover	Area	%	Soil type	Area	%	CN-II	CN-III	Ap	%	S	Ia	Y	Y (wght)	Fp (F.C-6)	Fm	Fm (wght)
Streets (offsite)	2.7	0.02	B	2.7	0.02	56	76	0.1	0.00	7.86	1.57	0.07	0.000	0.74	0.07	0.00
Condominiums	0	0.00	A	0	0.00	32	52	0.35	0.00	21.25	4.25	0.03	0.000	0.97	0.34	0.00
Residential 8-10	0	0.00	A	0	0.00	32	52	0.4	0.00	21.25	4.25	0.03	0.000	0.97	0.39	0.00
Residential 3-4	37.71	0.31	B	37.71	0.31	56	76	0.6	0.18	7.86	1.57	0.07	0.013	0.74	0.44	0.13
Residential 3-4 (60%)	0	0.00	C	0	0.00	72	89	0.85	0.00	3.89	0.78	0.27	0.000	0.51	0.43	0.00
Residential 2-3	0	0.00	B	0	0.00	56	76	0.9	0.00	7.86	1.57	0.07	0.000	0.74	0.67	0.00
Residential 5-7(4-6)	0	0.00	A	0	0.00	32	52	0.5	0.00	21.25	4.25	0.03	0.000	0.97	0.49	0.00
Open Brush	83.1	0.67	C	83.1	0.67	77	92	1	0.67	2.99	0.6	0.36	0.242	0.43	0.43	0.29
Basin	0	0.00	A	0	0.00	78	93	1	0.00	2.82	0.56	0.38	0.000	0.41	0.41	0.00

123.5 123.51

PERVIOUS	Y=	0.26
IMPERVIOUS	Y=	0.37
SUM		0.62

Fm= 0.43

P-24= 3.00 in

Est Vol = 7.88 ac-ft

Low Loss Fraction,Y-bar = 0.377

Return Period 100

AMC Type II (I,II or III)

Lag Time

Tc = 14.5 min
Lag = 11.6 min

from Rational Method Study

Run:

Lag = 0.19 hr

24-hr Rainfall (other than 100 yr)

T (yr)	I (in)
2	1.05
100	3
100	3

INPUT SUMMARY FOR UNIT HYDROGRAPH

(Table 8-a)

Project:	<u>TTM 20275</u>		Date:	4/30/2019 652-2039	
Engineer:	<u>TGS</u>				
Notes:	<u>100-year Developed</u>	<u>Set #6</u>			
				<u>1st-24hr</u>	<u>2nd-24hr</u>
1	Design Storm		yr	<u>100</u>	
2	Catchment Lag time		hrs	<u>0.190</u>	
3	Catchment Area		acres	<u>14.5</u>	
4	Base flow		cfs/sq mi	<u>123.5</u>	
5	S-graph			<u>0</u>	
6	Maximum loss rate, Fm		in/hr	<u>Desert</u>	
7	Low loss fraction, Y-bar			<u>0.43</u>	
8	Watershed area-averaged 5 -minute point rainfall		inches	<u>0.34</u>	<u>0.12</u>
	Watershed area-averaged 30 -minute point rainfall		inches	<u>0.79</u>	<u>0.29</u>
	Watershed area-averaged 1 -hour point rainfall		inches	<u>1.10</u>	<u>0.40</u>
	Watershed area-averaged 3 -hour point rainfall		inches	<u>1.49</u>	<u>0.54</u>
	Watershed area-averaged 6 -hour point rainfall		inches	<u>1.80</u>	<u>0.65</u>
	Watershed area-averaged 24 -hour point rainfall		inches	<u>3.00</u>	<u>1.08</u>
9	24-hour storm unit interval		minutes	<u>5</u>	
Point rainfall unadjusted by depth-area factors					
10	Depth-area adjustment factors (Fig E-4)		5-min	<u> </u>	
		30-min	<u> </u>		
		1-hr	<u> </u>		
		3-hr	<u> </u>		
		6-hr	<u> </u>		
		24-hr	<u> </u>		

DETENTION BASIN
VOLUME-DISCHARGE DATA

TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

DETENTION BASIN VOLUME-DISCHARGE DATA

CALCULATION SET-UP

The detention basin will have a bottom elevation set at 3236, and a top elevation of 3244 with 3:1 side slopes.

This study included a preliminary outlet structure with a 30" pipe that will control the outflow. The pipe would be placed above the required retention of the water quality volume at an invert elevation of 3238.5.

DEPTH OF WATER AT THE OUTLET STRUCTURE

Therefore, the output data from the Unit Hydrograph Flood Routing indicates that the depth of the water in the basin is 5.6 feet.

Bottom of Basin: 3236

Top Basin: 3244

Depth of Basin: 3244-3236=8.0 Feet

Water needs to fill the basin with the water quality volume before entering the outlet structure. The maximum retained water quality volume is 1.68 ac-ft at a depth of 2.5 feet. After this volume is filled the 30" RCP storm drain will start metering the outflow to the north side of Luna Road.

Maximum 100 year Water Surface: EI 3241.6 = 5.6 ft

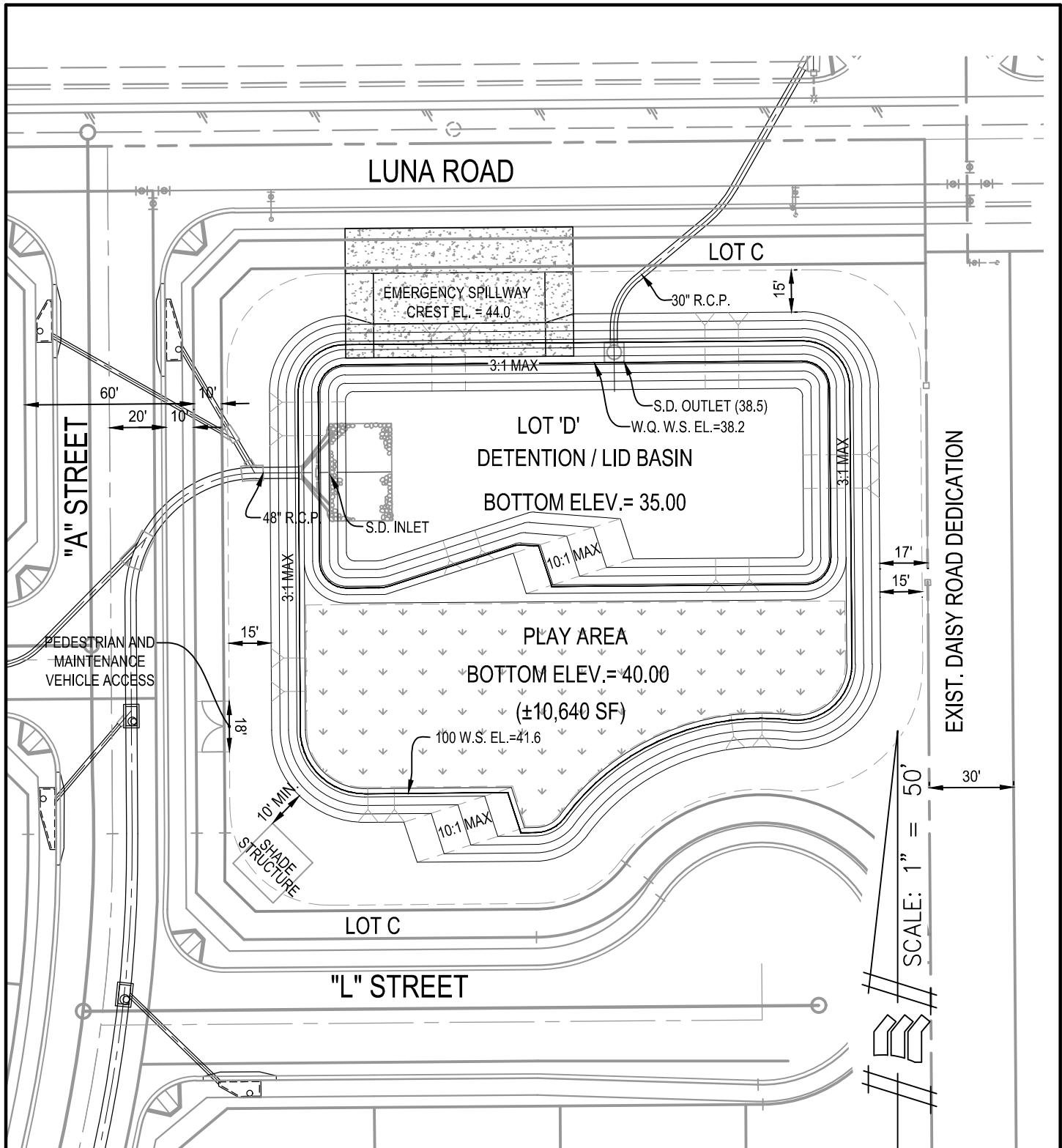


FIGURE 6



9302 PITTSBURGH AVE, SUITE 230
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DETENTION/WQMP BASIN EXHIBIT

TENTATIVE TRACT No. 20275

IN THE CITY OF VICTORVILLE, CA.

Detention Basin Volume

Contours Elevation	Area (Sf)	Depth (Ft)	Volume (Cu. Ft)	Volume (Ac. Ft)	Total Volume (Ac-Ft)
3236	24,881		0		0
		1	28,033	0.64	
3237	26,963				0.64
		1	29,646	0.68	
3238	29,102				1.32
		0.5	15,372	0.35	
3238.5	30,189				1.68
		0.5	15,928	0.37	
3239	31,297				2.04
		0.5	15,928	0.37	
3239.5	32,413				2.41
		0.5	16,491	0.38	
3240	33,549				2.79
		0.5	17,061	0.39	
3240.5	34,696				3.18
		0.5	17,638	0.40	
3241	35,857				3.58
		0.5	18,222	0.42	
3241.5	37,032				4.00
		0.5	18,846	0.43	
3242	38,350				4.43
		0.5	19,443	0.45	
3242.5	39,423				4.88
		0.5	20,017	0.46	
3243	40,643				5.34
		0.5	20,630	0.47	
3243.5	41,875				5.81
		0.5	21,249	0.49	
3244	43,121				6.30

WQ ELEV.= 3238.2
WQ VOLUME = 1.44

BASIN - DEPTH VS. DISCHARGE

C		0.6
D		2.5
A		4.9
g		32.2

ft ft2 ft/sec

$$Q = C^* A^* ((2^* g^* H_0)^{0.5})$$

INFILTRATION RATE	44	IN/HR
FACTOR OF SAFETY	3.125	
	0.000325926	FT/SEC

No. of Pipes	1
--------------	---

INLET EL. 3238.5
H0 3239.75

DETENTION BASIN UNIT
HYDROGRAPH FLOOD ROUTING
ANALYSIS

TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

TENTATIVE TRACT 20275
INPUT SUMMARY FOR UNIT HYDROGRAPH
DEVELOPED CONDITIONS

(Table 3-b)

NODE	SUBAREA	LAG TIME (HR.)	Tc (MIN.)	AREA (AC.)	S-GRAFH	MAX. LOSS, Fm (IN/HR)	LOW LOSS Y-BAR	
10.9	A-D, S, O	0.19	14.5	123.5	DESERT	0.43	0.38	

SMALL AREA UNIT HYDROGRAPH MODEL
=====

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Analysis prepared by:

MADOLE & ASSOCIATES, INC.
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RANCHO CUCAMONGA, CA 91730

Problem Descriptions:

TENTATIVE TRACT No. 20275 - CITY OF VICTORVILLE, CA
100 YEAR UNIT HYDROGRAPH - DEVELOPED CONDITION

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.60
TOTAL CATCHMENT AREA(ACRES) = 123.50
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.430
LOW LOSS FRACTION = 0.380
TIME OF CONCENTRATION(MIN.) = 14.50
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.34
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.79
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.10
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.49
6-HOUR POINT RAINFALL VALUE(INCHES) = 1.80
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.00

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 12.09
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 18.79

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	37.5	75.0	112.5	150.0
0.05	0.0000	0.00	Q	.	.	.	.
0.29	0.0212	2.13	Q	.	.	.	.
0.53	0.0639	2.14	Q	.	.	.	.
0.77	0.1069	2.17	Q	.	.	.	.
1.02	0.1504	2.18	Q	.	.	.	.
1.26	0.1943	2.21	Q	.	.	.	.
1.50	0.2386	2.23	Q	.	.	.	.
1.74	0.2835	2.26	Q	.	.	.	.
1.98	0.3287	2.28	Q	.	.	.	.

2.22	0.3745	2.31	Q	.	.	.	.
2.47	0.4208	2.33	Q	.	.	.	.
2.71	0.4676	2.36	Q	.	.	.	.
2.95	0.5150	2.38	Q	.	.	.	.
3.19	0.5628	2.42	Q	.	.	.	.
3.43	0.6113	2.44	Q	.	.	.	.
3.67	0.6603	2.47	Q	.	.	.	.
3.92	0.7100	2.50	Q	.	.	.	.
4.16	0.7602	2.54	Q	.	.	.	.
4.40	0.8111	2.56	Q	.	.	.	.
4.64	0.8627	2.60	Q	.	.	.	.
4.88	0.9149	2.63	Q	.	.	.	.
5.12	0.9679	2.68	Q	.	.	.	.
5.37	1.0216	2.70	Q	.	.	.	.
5.61	1.0760	2.75	Q	.	.	.	.
5.85	1.1312	2.78	Q	.	.	.	.
6.09	1.1873	2.83	Q	.	.	.	.
6.33	1.2442	2.86	Q	.	.	.	.
6.57	1.3020	2.92	Q	.	.	.	.
6.82	1.3607	2.96	Q	.	.	.	.
7.06	1.4204	3.02	Q	.	.	.	.
7.30	1.4811	3.06	Q	.	.	.	.
7.54	1.5429	3.13	Q	.	.	.	.
7.78	1.6057	3.17	Q	.	.	.	.
8.02	1.6697	3.24	Q	.	.	.	.
8.27	1.7349	3.28	Q	.	.	.	.
8.51	1.8014	3.37	Q	.	.	.	.
8.75	1.8692	3.42	Q	.	.	.	.
8.99	1.9384	3.51	Q	.	.	.	.
9.23	2.0091	3.56	Q	.	.	.	.
9.48	2.0813	3.67	Q	.	.	.	.
9.72	2.1552	3.73	Q	.	.	.	.
9.96	2.2309	3.85	.Q	.	.	.	.
10.20	2.3084	3.91	.Q	.	.	.	.
10.44	2.3880	4.05	.Q	.	.	.	.
10.68	2.4697	4.13	.Q	.	.	.	.
10.93	2.5536	4.28	.Q	.	.	.	.
11.17	2.6401	4.37	.Q	.	.	.	.
11.41	2.7292	4.55	.Q	.	.	.	.
11.65	2.8212	4.66	.Q	.	.	.	.
11.89	2.9163	4.87	.Q	.	.	.	.
12.13	3.0149	4.99	.Q	.	.	.	.
12.38	3.1038	3.91	.Q	.	.	.	.
12.62	3.1832	4.04	.Q	.	.	.	.
12.86	3.2667	4.32	.Q	.	.	.	.
13.10	3.3546	4.48	.Q	.	.	.	.
13.34	3.4477	4.85	.Q	.	.	.	.
13.58	3.5467	5.06	.Q	.	.	.	.
13.82	3.6527	5.56	.Q	.	.	.	.
14.07	3.7667	5.86	.Q	.	.	.	.
14.31	3.8917	6.66	.Q	.	.	.	.
14.55	4.0293	7.12	.Q	.	.	.	.
14.79	4.1833	8.30	. Q	.	.	.	.
15.03	4.3569	9.09	. Q	.	.	.	.
15.27	4.5612	11.38	. Q	.	.	.	.
15.52	4.8205	14.58	. Q	.	.	.	.
15.76	5.2810	31.54	. Q .	.	.	.	.

16.00	6.0068	41.13	.	Q	.	.	.	.
16.24	7.8175	140.19	.	.	.	.	Q	.
16.48	9.4812	26.41	.	Q	.	.	.	.
16.73	9.8456	10.08	.	Q	.	.	.	.
16.97	10.0227	7.65	.	Q	.	.	.	.
17.21	10.1613	6.23	.	Q	.	.	.	.
17.45	10.2764	5.30	.	Q	.	.	.	.
17.69	10.3758	4.66	.	Q	.	.	.	.
17.93	10.4639	4.17	.	Q	.	.	.	.
18.17	10.5458	4.02	.	Q	.	.	.	.
18.42	10.6335	4.76	.	Q	.	.	.	.
18.66	10.7256	4.46	.	Q	.	.	.	.
18.90	10.8121	4.20	.	Q	.	.	.	.
19.14	10.8938	3.98	.	Q	.	.	.	.
19.38	10.9714	3.79	.	Q	.	.	.	.
19.62	11.0454	3.62	Q	.	.	.	.	.
19.87	11.1161	3.46	Q	.	.	.	.	.
20.11	11.1839	3.33	Q	.	.	.	.	.
20.35	11.2491	3.20	Q	.	.	.	.	.
20.59	11.3120	3.09	Q	.	.	.	.	.
20.83	11.3727	2.99	Q	.	.	.	.	.
21.08	11.4314	2.89	Q	.	.	.	.	.
21.32	11.4884	2.81	Q	.	.	.	.	.
21.56	11.5436	2.73	Q	.	.	.	.	.
21.80	11.5973	2.65	Q	.	.	.	.	.
22.04	11.6496	2.58	Q	.	.	.	.	.
22.28	11.7005	2.52	Q	.	.	.	.	.
22.52	11.7501	2.45	Q	.	.	.	.	.
22.77	11.7986	2.40	Q	.	.	.	.	.
23.01	11.8459	2.34	Q	.	.	.	.	.
23.25	11.8922	2.29	Q	.	.	.	.	.
23.49	11.9375	2.24	Q	.	.	.	.	.
23.73	11.9819	2.20	Q	.	.	.	.	.
23.98	12.0253	2.15	Q	.	.	.	.	.
24.22	12.0680	2.12	Q	.	.	.	.	.
24.46	12.0892	0.00	Q	.	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:

(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

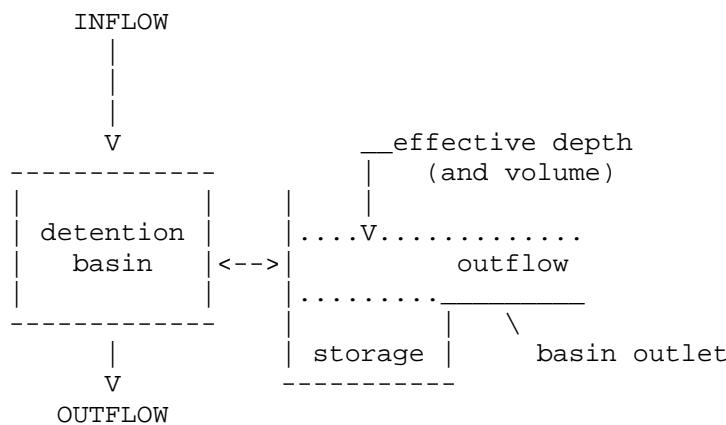
Percentile of Estimated Peak Flow Rate	Duration (minutes)
=====	=====
0%	1450.0
10%	72.5
20%	43.5
30%	14.5
40%	14.5
50%	14.5
60%	14.5
70%	14.5
80%	14.5
90%	14.5

Problem Descriptions:

TENTATIVE TRACT 20275 - CITY OF VICTORVILLE, CA.
 100 YEAR UNIT HYDROGRAPH AND FLOOD ROUTING ANALYSIS
 DETENTION BASIN

=====
 FLOW-THROUGH DETENTION BASIN MODEL

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
 CONSTANT HYDROGRAPH TIME UNIT(MINUTES) = 14.500
 DEAD STORAGE(AF) = 0.00
 SPECIFIED DEAD STORAGE(AF) FILLED = 0.00
 ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN = 0.00



DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:

TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 15

*BASIN-DEPTH		STORAGE	OUTFLOW	**BASIN-DEPTH		STORAGE	OUTFLOW	*
*	(FEET)	(ACRE-FEET)	(CFS)	**	(FEET)	(ACRE-FEET)	(CFS)	*
*	0.000	0.000	0.000**	1.000	0.640	8.600*		
*	2.000	1.320	9.300**	2.500	1.680	9.600*		
*	3.000	2.040	10.000**	3.500	2.410	13.200*		
*	4.000	2.790	22.000**	4.500	3.180	34.700*		
*	5.000	3.580	37.800**	5.500	4.000	43.100*		
*	6.000	4.430	47.700**	6.500	4.880	51.800*		
*	7.000	5.340	55.600**	7.500	5.810	59.100*		
*	8.000	6.300	62.500**					

BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL	DEPTH	{S-O*DT/2}	{S+O*DT/2}
NUMBER	(FEET)	(ACRE-FEET)	(ACRE-FEET)
1	0.00	0.00000	0.00000
2	1.00	0.55412	0.72588
3	2.00	1.22713	1.41287
4	2.50	1.58413	1.77587
5	3.00	1.94014	2.13986
6	3.50	2.27818	2.54182
7	4.00	2.57030	3.00970
8	4.50	2.83348	3.52652
9	5.00	3.20252	3.95748

10	5.50	3.56959	4.43041
11	6.00	3.95366	4.90634
12	6.50	4.36271	5.39729
13	7.00	4.78477	5.89523
14	7.50	5.21981	6.40019
15	8.00	5.67586	6.92414

WHERE S=STORAGE(AF); O=OUTFLOW(AF/MIN.); DT=UNIT INTERVAL(MIN.)

DETENTION BASIN ROUTING RESULTS:

NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES
OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE
AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
0.050	0.000	0.00	0.00	0.00	0.000
0.292	0.000	2.13	0.06	0.25	0.037
0.533	0.000	2.14	0.10	0.70	0.066
0.775	0.000	2.17	0.14	1.04	0.089
1.017	0.000	2.18	0.17	1.31	0.106
1.258	0.000	2.21	0.19	1.52	0.120
1.500	0.000	2.23	0.20	1.69	0.131
1.742	0.000	2.26	0.22	1.82	0.140
1.983	0.000	2.28	0.23	1.92	0.147
2.225	0.000	2.31	0.24	2.01	0.153
2.467	0.000	2.33	0.25	2.08	0.158
2.708	0.000	2.36	0.25	2.15	0.162
2.950	0.000	2.38	0.26	2.20	0.165
3.192	0.000	2.42	0.26	2.25	0.169
3.433	0.000	2.44	0.27	2.29	0.172
3.675	0.000	2.47	0.27	2.33	0.175
3.917	0.000	2.50	0.28	2.37	0.177
4.158	0.000	2.54	0.28	2.40	0.180
4.400	0.000	2.56	0.29	2.44	0.182
4.642	0.000	2.60	0.29	2.47	0.185
4.883	0.000	2.63	0.29	2.50	0.188
5.125	0.000	2.68	0.30	2.54	0.190
5.367	0.000	2.70	0.30	2.57	0.193
5.608	0.000	2.75	0.31	2.61	0.196
5.850	0.000	2.78	0.31	2.65	0.198
6.092	0.000	2.83	0.31	2.69	0.201
6.333	0.000	2.86	0.32	2.72	0.204
6.575	0.000	2.92	0.32	2.76	0.207
6.817	0.000	2.96	0.33	2.81	0.210
7.058	0.000	3.02	0.33	2.85	0.214
7.300	0.000	3.06	0.34	2.89	0.217
7.542	0.000	3.13	0.34	2.94	0.221
7.783	0.000	3.17	0.35	2.99	0.224
8.025	0.000	3.24	0.36	3.04	0.228
8.267	0.000	3.28	0.36	3.09	0.232
8.508	0.000	3.37	0.37	3.15	0.237
8.750	0.000	3.42	0.38	3.21	0.241
8.992	0.000	3.51	0.38	3.27	0.246
9.233	0.000	3.56	0.39	3.33	0.250
9.475	0.000	3.67	0.40	3.40	0.256
9.717	0.000	3.73	0.41	3.47	0.261

9.958	0.000	3.85	0.42	3.55	0.267
10.200	0.000	3.91	0.43	3.63	0.273
10.442	0.000	4.05	0.44	3.71	0.280
10.683	0.000	4.13	0.45	3.80	0.286
10.925	0.000	4.28	0.46	3.90	0.294
11.167	0.000	4.37	0.47	4.00	0.301
11.408	0.000	4.55	0.48	4.11	0.310
11.650	0.000	4.66	0.50	4.23	0.319
11.892	0.000	4.87	0.51	4.35	0.329
12.133	0.000	4.99	0.53	4.49	0.339
12.375	0.000	3.91	0.51	4.48	0.328
12.617	0.000	4.04	0.50	4.36	0.321
12.858	0.000	4.32	0.50	4.32	0.321
13.100	0.000	4.48	0.51	4.34	0.324
13.342	0.000	4.85	0.52	4.42	0.333
13.583	0.000	5.06	0.54	4.54	0.343
13.825	0.000	5.56	0.56	4.72	0.360
14.067	0.000	5.86	0.59	4.96	0.378
14.308	0.000	6.66	0.63	5.27	0.406
14.550	0.000	7.12	0.68	5.65	0.435
14.792	0.000	8.30	0.75	6.14	0.478
15.033	0.000	9.09	0.82	6.74	0.525
15.275	0.000	11.38	0.94	7.57	0.601
15.517	0.000	14.58	1.13	8.38	0.725
15.758	0.000	31.54	1.79	8.92	1.177
16.000	0.000	41.13	2.68	9.45	1.810
16.242	0.000	140.19	5.59	26.82	4.074
16.483	0.000	26.41	5.22	42.00	3.763
16.725	0.000	10.08	4.54	37.54	3.214
16.967	0.000	7.65	4.01	28.58	2.796
17.208	0.000	6.23	3.67	19.18	2.538
17.450	0.000	5.30	3.43	14.44	2.355
17.692	0.000	4.66	3.23	12.08	2.207
17.933	0.000	4.17	3.04	10.86	2.073
18.175	0.000	4.02	2.88	10.09	1.952
18.417	0.000	4.76	2.74	9.85	1.850
18.658	0.000	4.46	2.59	9.73	1.745
18.900	0.000	4.20	2.44	9.62	1.637
19.142	0.000	3.98	2.29	9.52	1.526
19.383	0.000	3.79	2.13	9.42	1.414
19.625	0.000	3.62	1.97	9.33	1.300
19.867	0.000	3.46	1.80	9.22	1.185
20.108	0.000	3.33	1.63	9.10	1.069
20.350	0.000	3.20	1.46	8.98	0.954
20.592	0.000	3.09	1.29	8.86	0.839
20.833	0.000	2.99	1.12	8.75	0.724
21.075	0.000	2.89	0.96	8.46	0.612
21.317	0.000	2.81	0.81	7.59	0.517
21.558	0.000	2.73	0.69	6.45	0.443
21.800	0.000	2.65	0.60	5.56	0.385
22.042	0.000	2.58	0.53	4.86	0.339
22.283	0.000	2.52	0.47	4.31	0.303
22.525	0.000	2.45	0.43	3.88	0.275
22.767	0.000	2.40	0.39	3.54	0.252
23.008	0.000	2.34	0.36	3.26	0.234
23.250	0.000	2.29	0.34	3.04	0.219
23.492	0.000	2.24	0.32	2.86	0.206

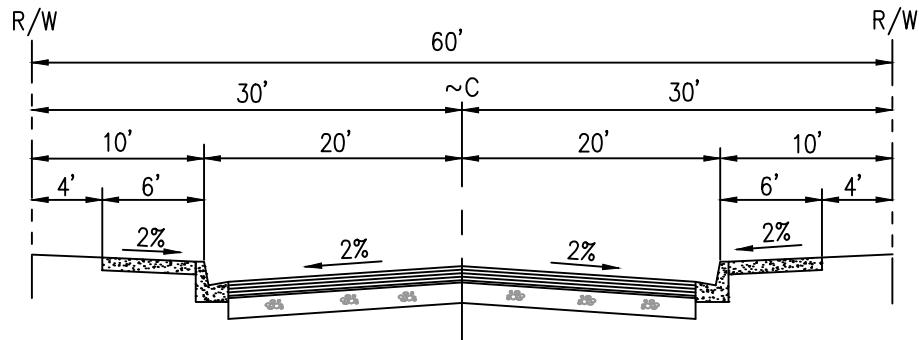
23.733	0.000	2.20	0.31	2.71	0.196
23.975	0.000	2.15	0.29	2.58	0.188
24.217	0.000	2.12	0.28	2.48	0.181
24.458	0.000	0.00	0.22	2.14	0.138
24.700	0.000	0.00	0.16	1.63	0.105
24.942	0.000	0.00	0.13	1.25	0.080
25.183	0.000	0.00	0.10	0.95	0.061
25.425	0.000	0.00	0.07	0.73	0.047
25.667	0.000	0.00	0.06	0.55	0.036
25.908	0.000	0.00	0.04	0.42	0.027
26.150	0.000	0.00	0.03	0.32	0.021
26.392	0.000	0.00	0.02	0.25	0.016
26.633	0.000	0.00	0.02	0.19	0.012
26.875	0.000	0.00	0.01	0.14	0.009
27.117	0.000	0.00	0.01	0.11	0.007
27.358	0.000	0.00	0.01	0.08	0.005
27.600	0.000	0.00	0.01	0.06	0.004
27.842	0.000	0.00	0.00	0.05	0.003
28.083	0.000	0.00	0.00	0.04	0.002
28.325	0.000	0.00	0.00	0.03	0.002
28.567	0.000	0.00	0.00	0.02	0.001
28.808	0.000	0.00	0.00	0.02	0.001

SECTION C
SAMPLE HYDRAULIC
CALCULATIONS

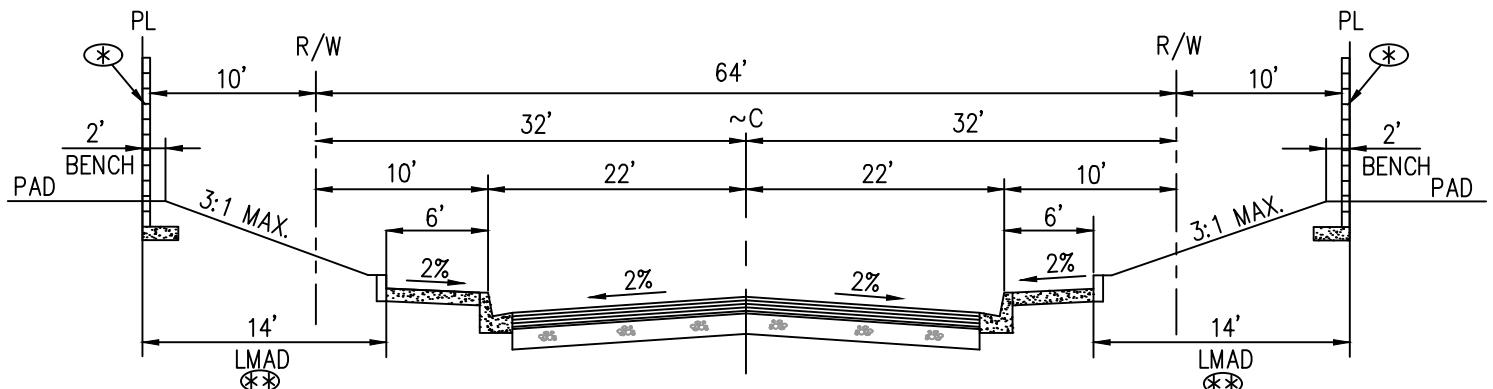
TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

STREET SECTIONS

TENTATIVE TRACT No. 20275 – VICTORVILLE, CA



TYPICAL SECTION FOR INTERIOR 60' STREET
NOT TO SCALE
B, C, D, E, F, G, H, I, J, K & L STREET



(*) 6' HIGH 8" SPLIT FACE LMAD BLOCK WALL PER LMAD DETAIL H-04 PER SEPARATE PLAN AND PERMIT (**) LMAD MAINTENANCE AREA PER STANDARD PLAN H-02

TYPICAL SECTION FOR INTERIOR 64' STREET
NOT TO SCALE
A STREET

FIGURE 7
TYPICAL STREET SECTIONS

SAMPLE STREET FLOW CALCULATIONS

TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

NOTE: VARIOUS STREET FLOW CALCULATIONS WERE PERFORMED IN
SECTION B: DEVELOPED RATIONAL METHOD ANALYSIS

NODE 10.6 SUB AREA C2

SUB AREA RUNOFF = 7.2 C.F.S.

STREET WIDTH=64'

>>>STREETFLOW MODEL INPUT INFORMATION<<<

CONSTANT STREET GRADE(FEET/FEET) = 0.010000

CONSTANT STREET FLOW(CFS) = 7.20

AVERAGE STREETFLOW FRICTION FACTOR(MANNING) = 0.015000

CONSTANT SYMMETRICAL STREET HALF-WIDTH(FEET) = 22.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.50

INTERIOR STREET CROSSFALL(DECIMAL) = 0.020000

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020000

CONSTANT SYMMETRICAL CURB HEIGHT(FEET) = 0.67

CONSTANT SYMMETRICAL GUTTER-WIDTH(FEET) = 1.50

CONSTANT SYMMETRICAL GUTTER-LIP(FEET) = 0.03125

CONSTANT SYMMETRICAL GUTTER-HIKE(FEET) = 0.16700

FLOW ASSUMED TO FILL STREET ON ONE SIDE, AND THEN SPLITS

=====

STREET FLOW MODEL RESULTS:

=====

STREET FLOW DEPTH(FEET) = 0.47

HALFSTREET FLOOD WIDTH(FEET) = 15.27

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.90

PRODUCT OF DEPTH&VELOCITY = 1.37

NODE 11.9 SUB AREA A9

SUB AREA RUNOFF = 4.8 C.F.S.
STREET WIDTH=64'

>>>STREETFLOW MODEL INPUT INFORMATION<<<

CONSTANT STREET GRADE(FEET/FEET) = 0.010000
CONSTANT STREET FLOW(CFS) = 4.80
AVERAGE STREETFLOW FRICTION FACTOR(MANNING) = 0.015000
CONSTANT SYMMETRICAL STREET HALF-WIDTH(FEET) = 22.00
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.50
INTERIOR STREET CROSSFALL(DECIMAL) = 0.020000
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020000
CONSTANT SYMMETRICAL CURB HEIGHT(FEET) = 0.67
CONSTANT SYMMETRICAL GUTTER-WIDTH(FEET) = 1.50
CONSTANT SYMMETRICAL GUTTER-LIP(FEET) = 0.03125
CONSTANT SYMMETRICAL GUTTER-HIKE(FEET) = 0.16700
FLOW ASSUMED TO FILL STREET ON ONE SIDE, AND THEN SPLITS

STREET FLOW MODEL RESULTS:

STREET FLOW DEPTH(FEET) = 0.42
HALFSTREET FLOOD WIDTH(FEET) = 12.71
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.72
PRODUCT OF DEPTH&VELOCITY = 1.15

NODE 13.4 SUB AREA D3

SUB AREA RUNOFF = 4.9 C.F.S.

STREET WIDTH=60'

>>>STREETFLOW MODEL INPUT INFORMATION<<<

CONSTANT STREET GRADE(FEET/FEET) = 0.008000

CONSTANT STREET FLOW(CFS) = 4.90

AVERAGE STREETFLOW FRICTION FACTOR(MANNING) = 0.015000

CONSTANT SYMMETRICAL STREET HALF-WIDTH(FEET) = 20.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 18.50

INTERIOR STREET CROSSFALL(DECIMAL) = 0.020000

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020000

CONSTANT SYMMETRICAL CURB HEIGHT(FEET) = 0.67

CONSTANT SYMMETRICAL GUTTER-WIDTH(FEET) = 1.50

CONSTANT SYMMETRICAL GUTTER-LIP(FEET) = 0.03125

CONSTANT SYMMETRICAL GUTTER-HIKE(FEET) = 0.16700

FLOW ASSUMED TO FILL STREET ON ONE SIDE, AND THEN SPLITS

STREET FLOW MODEL RESULTS:

STREET FLOW DEPTH(FEET) = 0.45

HALFSTREET FLOOD WIDTH(FEET) = 13.93

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.34

PRODUCT OF DEPTH&VELOCITY = 1.05

SAMPLE CATCH BASIN CALCULATIONS

TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

NODE 10.6 SUB AREA C2

SUB AREA RUNOFF = 7.2 C.F.S.

STREET WIDTH=64'

WIDTH = 22'

DEPTH OF FLOW IN APPROACH = 0.47'

>>>FLOWBY CATCH BASIN INLET CAPACITY INPUT INFORMATION<<<

Curb Inlet Capacities are approximated based on the Bureau of
Public Roads nomograph plots for flowby basins and sump basins.

STREETFLOW(CFS) = 7.20

GUTTER FLOWDEPTH(FEET) = 0.47

BASIN LOCAL DEPRESSION(FEET) = 0.33

FLOWBY BASIN ANALYSIS RESULTS:

BASIN WIDTH FLOW INTERCEPTION

1.59	1.12
2.00	1.40
2.50	1.72
3.00	2.04
3.50	2.36
4.00	2.68
4.50	2.99
5.00	3.29
5.50	3.56
6.00	3.81
6.50	4.05
7.00	4.30
7.50	4.53
8.00	4.77
8.50	4.99
9.00	5.20
9.50	5.41
10.00	5.59
10.50	5.76
11.00	5.93
11.50	6.09
12.00	6.24
12.50	6.38
13.00	6.52
13.50	6.65
14.00	6.78
14.50	6.90
15.00	7.01
15.50	7.12
15.87	7.20

NODE 11.9 SUB AREA A9

SUB AREA RUNOFF = 4.8 C.F.S.

STREET WIDTH=64'

WIDTH = 22'

DEPTH OF FLOW IN APPROACH = 0.42'

>>>FLOWBY CATCH BASIN INLET CAPACITY INPUT INFORMATION<<<

Curb Inlet Capacities are approximated based on the Bureau of
Public Roads nomograph plots for flowby basins and sump basins.

STREETFLOW(CFS) = 4.80

GUTTER FLOWDEPTH(FEET) = 0.42

BASIN LOCAL DEPRESSION(FEET) = 0.33

FLOWBY BASIN ANALYSIS RESULTS:

BASIN WIDTH	FLOW INTERCEPTION
1.19	0.73
1.50	0.91
2.00	1.19
2.50	1.47
3.00	1.75
3.50	2.02
4.00	2.27
4.50	2.50
5.00	2.71
5.50	2.92
6.00	3.13
6.50	3.33
7.00	3.51
7.50	3.68
8.00	3.83
8.50	3.98
9.00	4.12
9.50	4.25
10.00	4.37
10.50	4.49
11.00	4.61
11.50	4.71
11.91	4.80

NODE 13.4 SUB AREA D3

SUB AREA RUNOFF = 4.9 C.F.S.

STREET WIDTH=60'

WIDTH=29'

DEPTH IN APPROACH = 0.45'

>>>FLOWBY CATCH BASIN INLET CAPACITY INPUT INFORMATION<<<

Curb Inlet Capacities are approximated based on the Bureau of
Public Roads nomograph plots for flowby basins and sump basins.

STREETFLOW(CFS) = 4.90

GUTTER FLOWDEPTH(FEET) = 0.45

BASIN LOCAL DEPRESSION(FEET) = 0.33

FLOWBY BASIN ANALYSIS RESULTS:**BASIN WIDTH FLOW INTERCEPTION**

1.13	0.76
1.50	0.99
2.00	1.30
2.50	1.60
3.00	1.90
3.50	2.19
4.00	2.45
4.50	2.68
5.00	2.91
5.50	3.14
6.00	3.35
6.50	3.56
7.00	3.74
7.50	3.91
8.00	4.07
8.50	4.22
9.00	4.35
9.50	4.49
10.00	4.61
10.50	4.73
11.00	4.84
11.31	4.90

SECTION R
HYDROLOGIC REFERENCES AND
MAPS

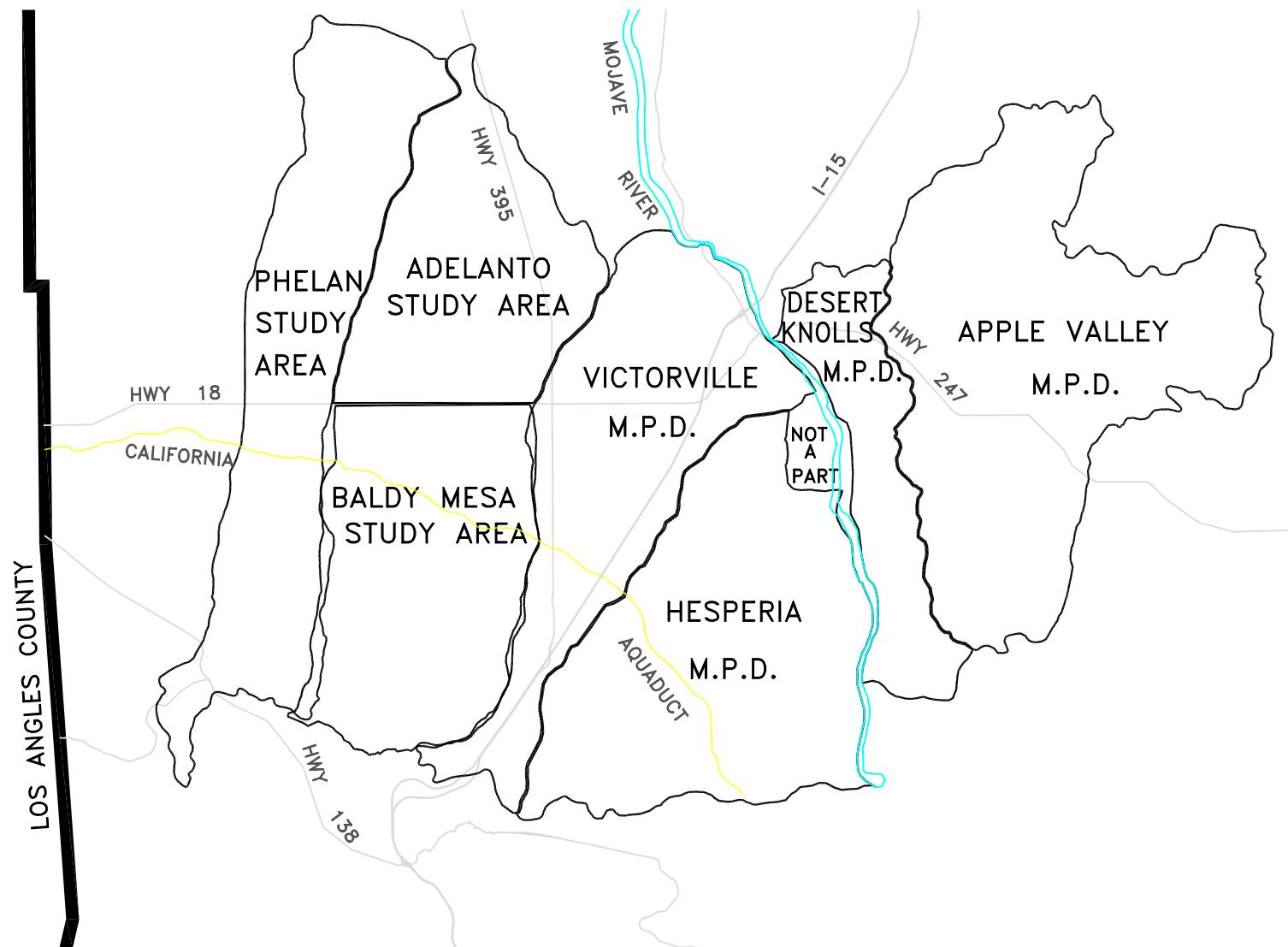
TENTATIVE TRACT No. 20275 – VICTORVILLE, CA

REFERENCE SOURCES

- County of San Bernardino Hydrology Manual, August 1986.
- County of San Bernardino Victorville Master Plan of Drainage, Baldy Mesa, (March 1992).

STATISTICS

Area 20,105 Sq. Mi.
Width 210 Mi
Length 135 Mi
Max. Elev. 11,502 Ft.
Min. Elev. Sea Level



SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
HIGH DESERT VICTORVILLE AREA



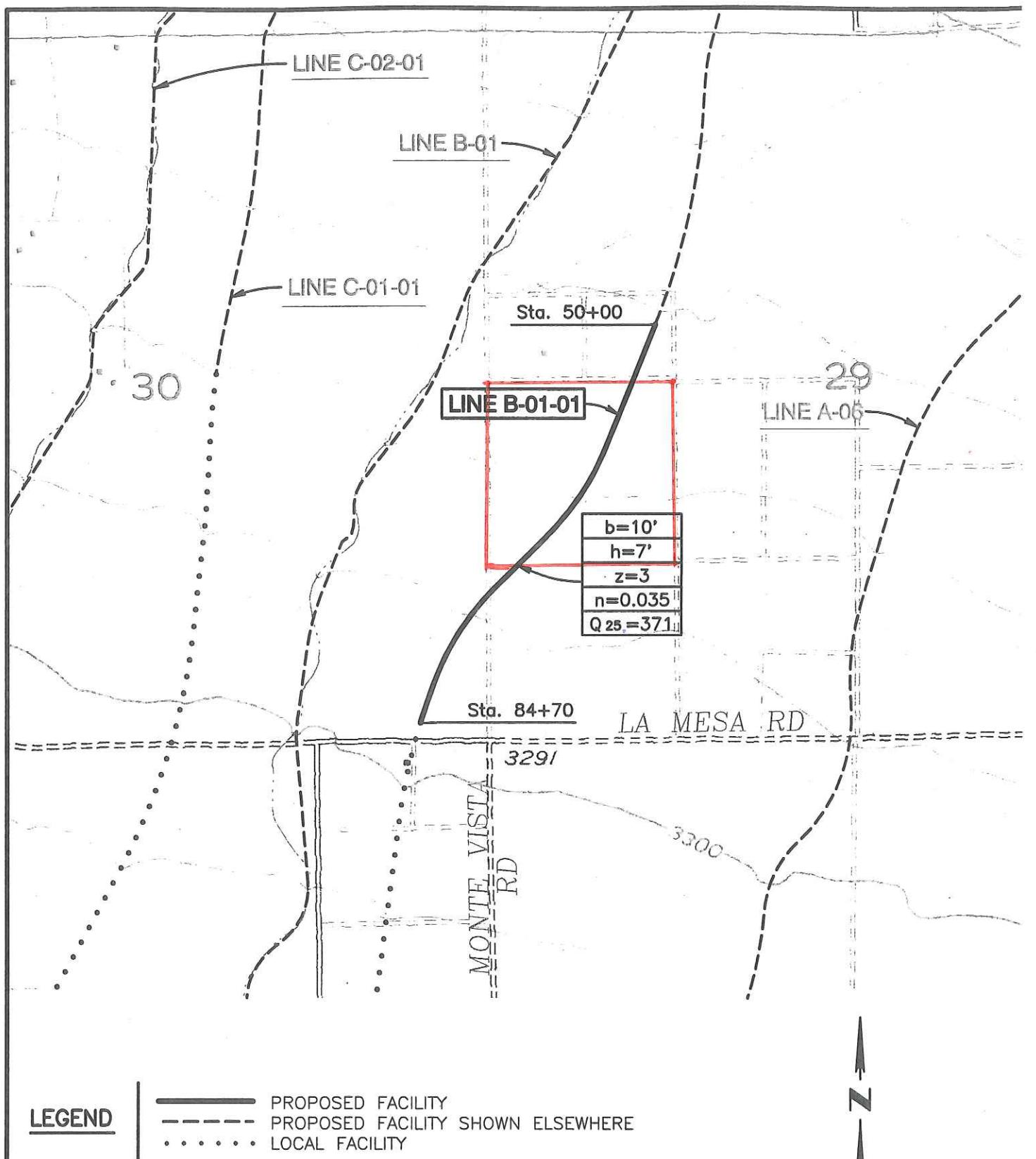


FIGURE 8

SCALE: 1" = 1000'

BALDY MESA

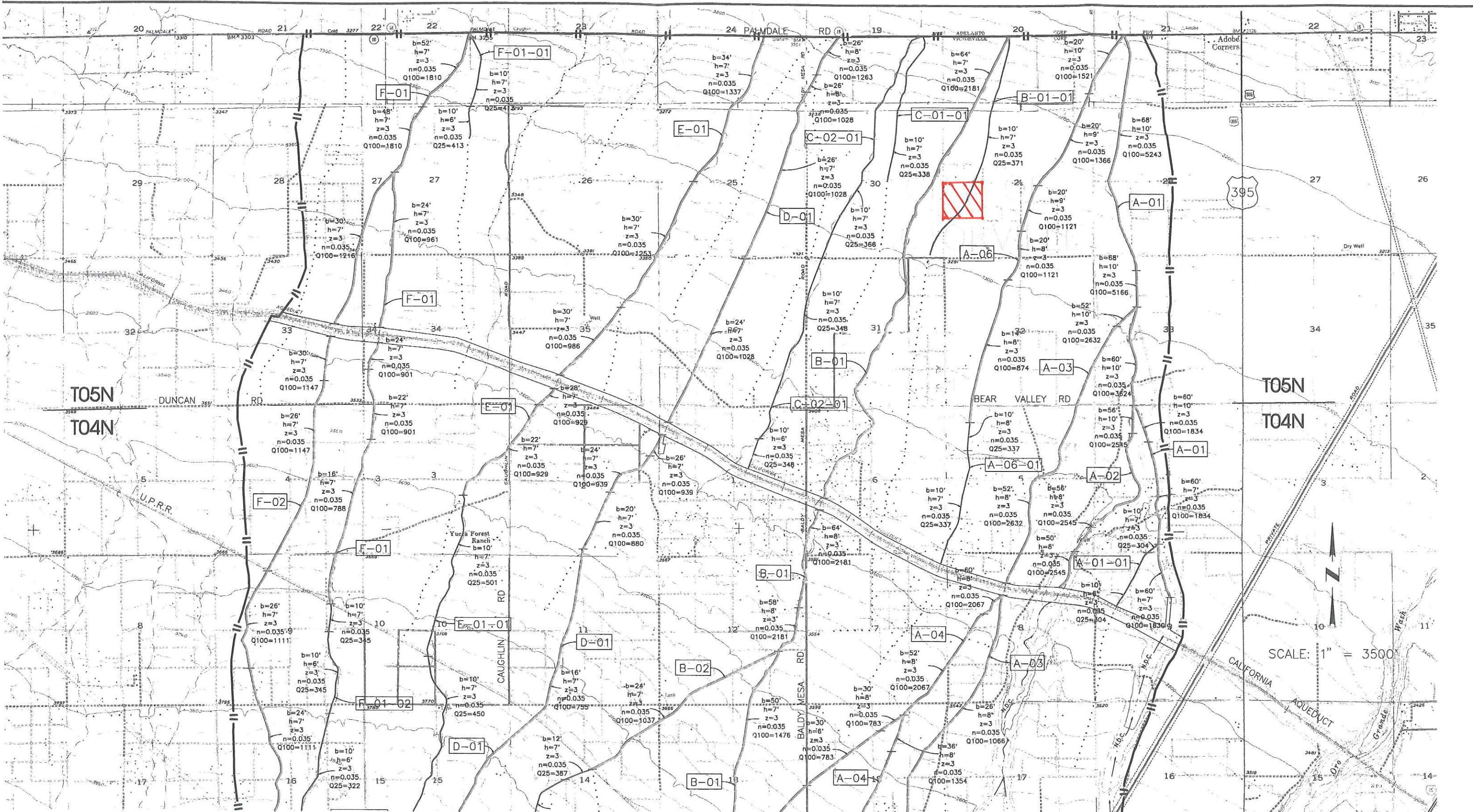
MASTER PLAN OF DRAINAGE



**SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT**

**SECONDARY FACILITY
LINE B-01-01**

DATE
F.B. REF.
FILE NO.
DWG. NO.
2 of 2



LOT AREA TABLE:

LOT NO.	LOT AREA	LOT NO.	LOT AREA	LOT NO.	LOT AREA
1	7,715	47	7,260	93	9,354
2	7,259	48	7,260	94	8,228
3	7,262	49	7,553	95	7,700
4	7,265	50	8,050	96	7,695
5	7,246	51	7,700	97	7,804
6	7,262	52	7,700	98	15,340
7	7,242	53	7,700	99	10,789
8	8,973	54	7,700	100	8,031
9	13,581	55	7,700	101	10,206
10	8,617	56	7,700	102	15,761
11	7,245	57	7,700	103	16,644
12	7,219	58	10,170	104	10,690
13	7,223	59	8,832	105	9,614
14	7,227	60	7,700	106	8,799
15	7,231	61	7,700	107	10,001
16	7,235	62	7,700	108	14,988
17	7,239	63	7,700	109	8,963
18	7,243	64	8,378	110	7,205
19	7,248	65	8,213	111	7,205
20	7,252	66	7,627	112	7,264
21	7,484	67	7,627	113	7,287
22	8,561	68	7,665	114	7,310
23	7,999	69	7,665	115	8,634
24	7,999	70	7,755	116	7,928
25	7,755	71	12,549	117	8,299
26	7,794	72	8,953	118	12,777
27	7,794	73	8,424	119	15,476
28	7,752	74	8,714	120	8,145
29	7,794	75	10,562	121	7,986
30	8,157	76	11,440	122	7,727
31	7,248	77	14,265	123	7,572
32	7,260	78	16,219	124	7,424
33	7,260	79	10,652	125	7,347
34	7,260	80	7,205	126	7,259
35	7,553	81	7,205	127	7,230
36	7,553	82	7,873	128	12,445
37	7,260	83	7,756	129	13,587
38	7,260	84	7,356	130	8,475
39	7,260	85	7,244	131	8,470
40	7,260	86	7,344	132	8,060
41	12,494	87	7,444	133	7,260
42	20,551	88	8,125	134	7,260
43	11,895	89	8,863	135	8,301
44	7,232	90	7,500	136	56,220
45	7,260	91	7,205		
46	7,260	92	8,515		

SQUARE FEET	ACRE	%
TOTAL LOT AREA (136)	1,24,667 S.F.	28.11 AC.
LOT A	3,718 S.F.	0.085 AC.
LOT B	15,911 S.F.	0.37 AC.
LOT C	1,903 S.F.	0.044 AC.
LOT D	4,773 S.F.	0.11 AC.
ON-SITE STREET	391,654 S.F.	8.99 AC.
OFF-SITE STREET	116,358 S.F.	2.67 AC.
TOTAL SITE	1,758,984 S.F.	40.38 AC.
		100.00 %

NOTES:

- TRACT 20275 ACREAGE
40.36 +/- ACRES
- TOTAL NUMBER OF LOTS
135 SINGLE FAMILY
1 DETENTION BASIN
4 LETTERED LMS
- LOT AREA
SEE TABLE HEREON
MIN. 7,200 S.F. FOR SINGLE FAMILY
- EXISTING ZONING
R1
- PROPOSED LAND USE.
SINGLE FAMILY DETACHED
- EXISTING LAND USE
VACANT LAND
- PUBLIC UTILITIES:
WATER SERVICE VICTORVILLE WATER DISTRICT
SEWER SERVICE CITY OF VICTORVILLE
ELECTRIC SERVICE SOUTHERN CALIFORNIA EDISON
GAS SERVICE SOUTHWEST GAS CORPORATION
TELEPHONE SERVICE VERIZON
CABLE TELEVISION SERVICE CHARTER COMMUNICATION
- ALL PROPOSED UTILITIES SHALL BE UNDERGROUND.
- APPROVAL OF THIS TENTATIVE PARCEL MAP SHALL BE IN FORCE FOR A PERIOD OF THIRTY-SIX MONTHS.
FOR LANDSCAPE AND PEDESTRIAN.

UTILITIES:

ELECTRIC:
SOUTHERN CALIFORNIA EDISON
12353 HESPERIA ROAD
VICTORVILLE, CA 92392
PHONE: (760) 951-3219

GAS:
SOUTHWEST GAS CORPORATION
13471 MARIPOSA ROAD
VICTORVILLE, CA 92392
PHONE: (760) 957-4044

WATER:
VICTORVILLE WATER DISTRICT
14343 CIVIC DRIVE
VICTORVILLE, CA 92392
PHONE: (760) 245-6424

TELEPHONE:
VERIZON
15055 LA PAZ DRIVE
VICTORVILLE, CA 92392
PHONE: (760) 243-0200

SCHOOL DISTRICT:
SNOWLINE JOINT UNIFIED SCHOOL DISTRICT (K-12)
P.O. BOX 296000
PHELAN, CA 92329-6000
PHONE: (760) 868-5817

CABLE:
CHARTER COMMUNICATION
12490 BUSINESS CENTER DR. SUITE 2
VICTORVILLE, CA 92392
PHONE: (866) 499-8080

DEVELOPER:

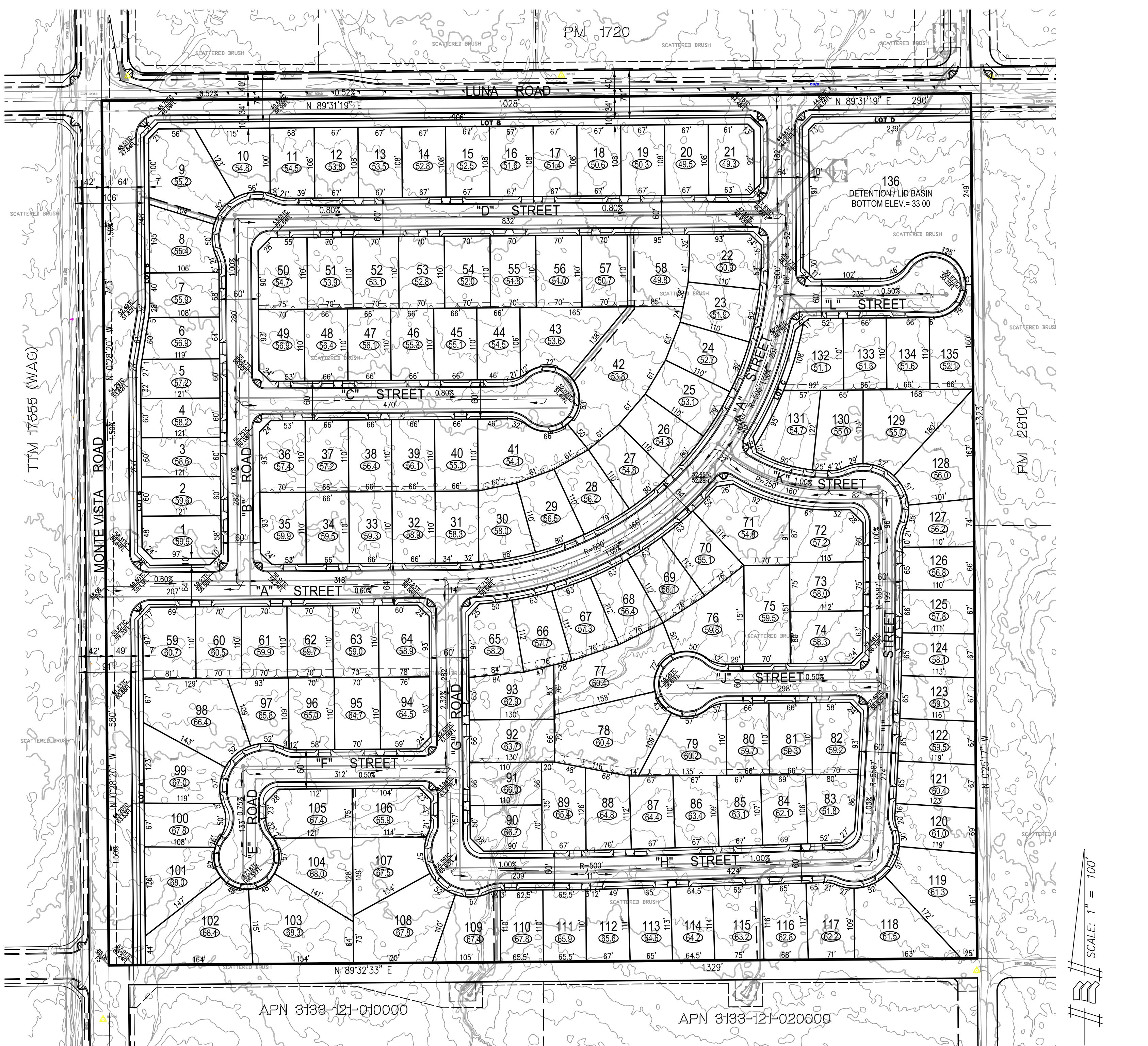
KB HOME SOUTHERN CALIFORNIA COASTAL INC.
36310 INLAND VALLEY DRIVE
WILDOMAR, CA 92595
PHONE: (909) 691-5300

VESTING TENTATIVE MAP, TRACT NO. 20275

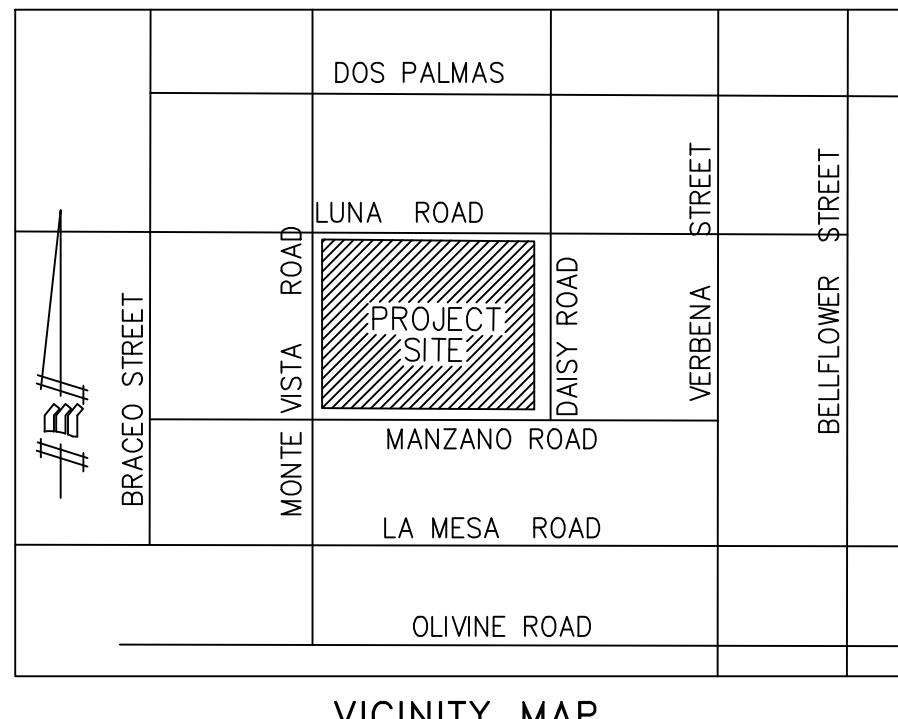
IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA
BEING A PROPOSED SUBDIVISION OF A PORTION OF SOUTHWEST QUARTER
OF SECTION 29, TOWNSHIP 5 NORTH, RANGE 5 WEST, S.B.M.

APN NO. 3133-111-01

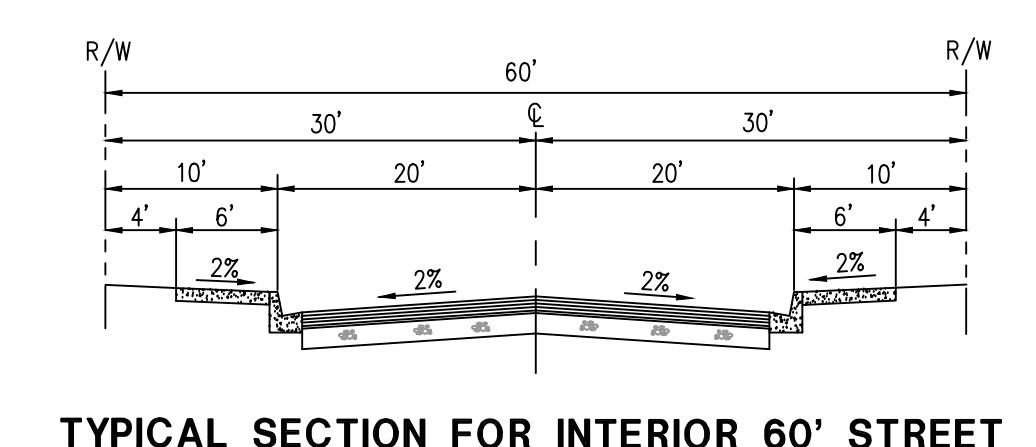
REVISED DATE: APRIL 4, 2019



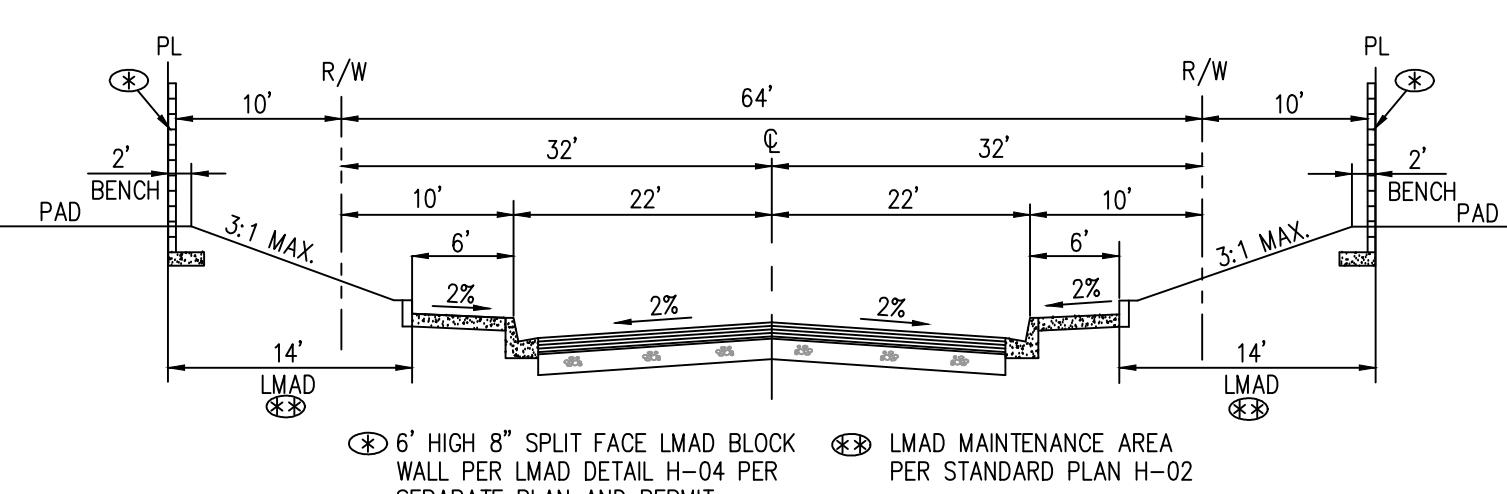
SCALE IN FEET
0 100 200 300 400



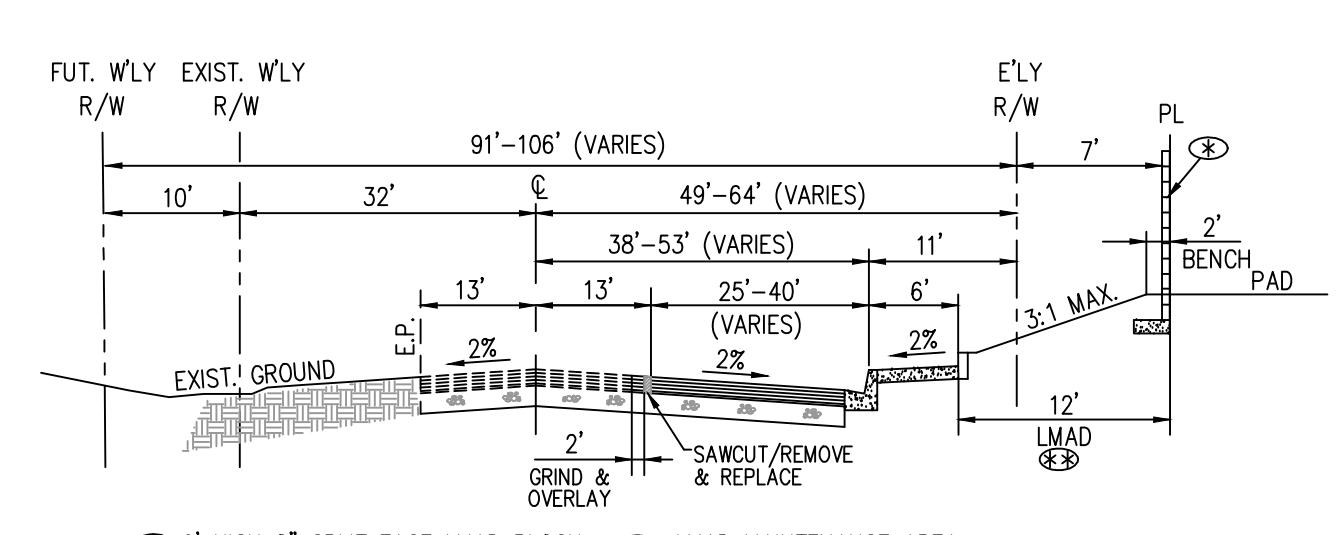
VICINITY MAP
NOT TO SCALE



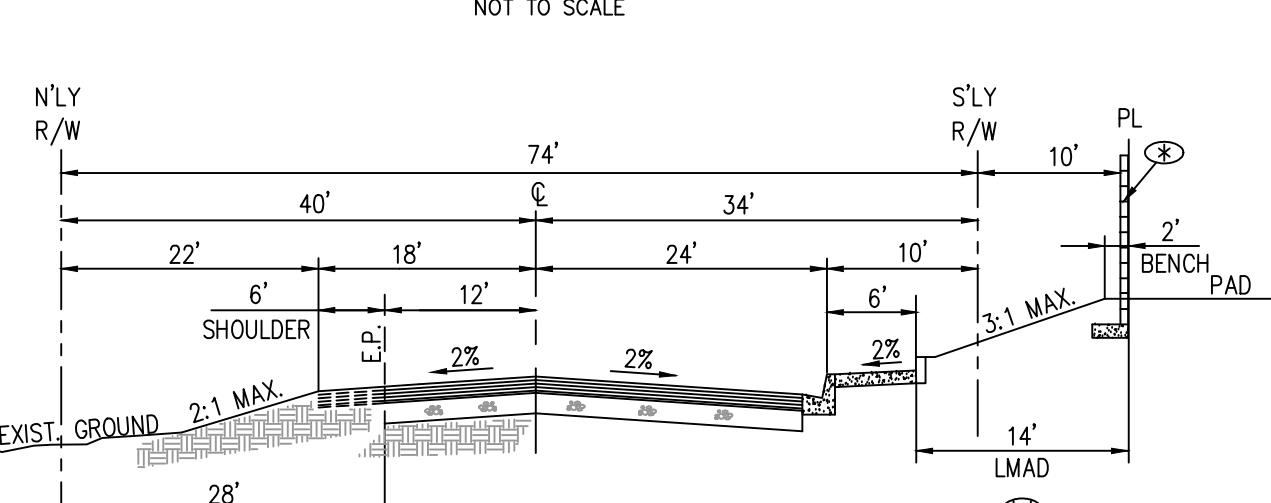
TYPICAL SECTION FOR INTERIOR 60' STREET
NOT TO SCALE
B, C, D, E, F, G, H, I, J, K & L STREET



TYPICAL SECTION FOR INTERIOR 64' STREET
NOT TO SCALE
A STREET



TYPICAL SECTION FOR MONTE VISTA ROAD
NOT TO SCALE



TYPICAL SECTION FOR LUNA ROAD
NOT TO SCALE



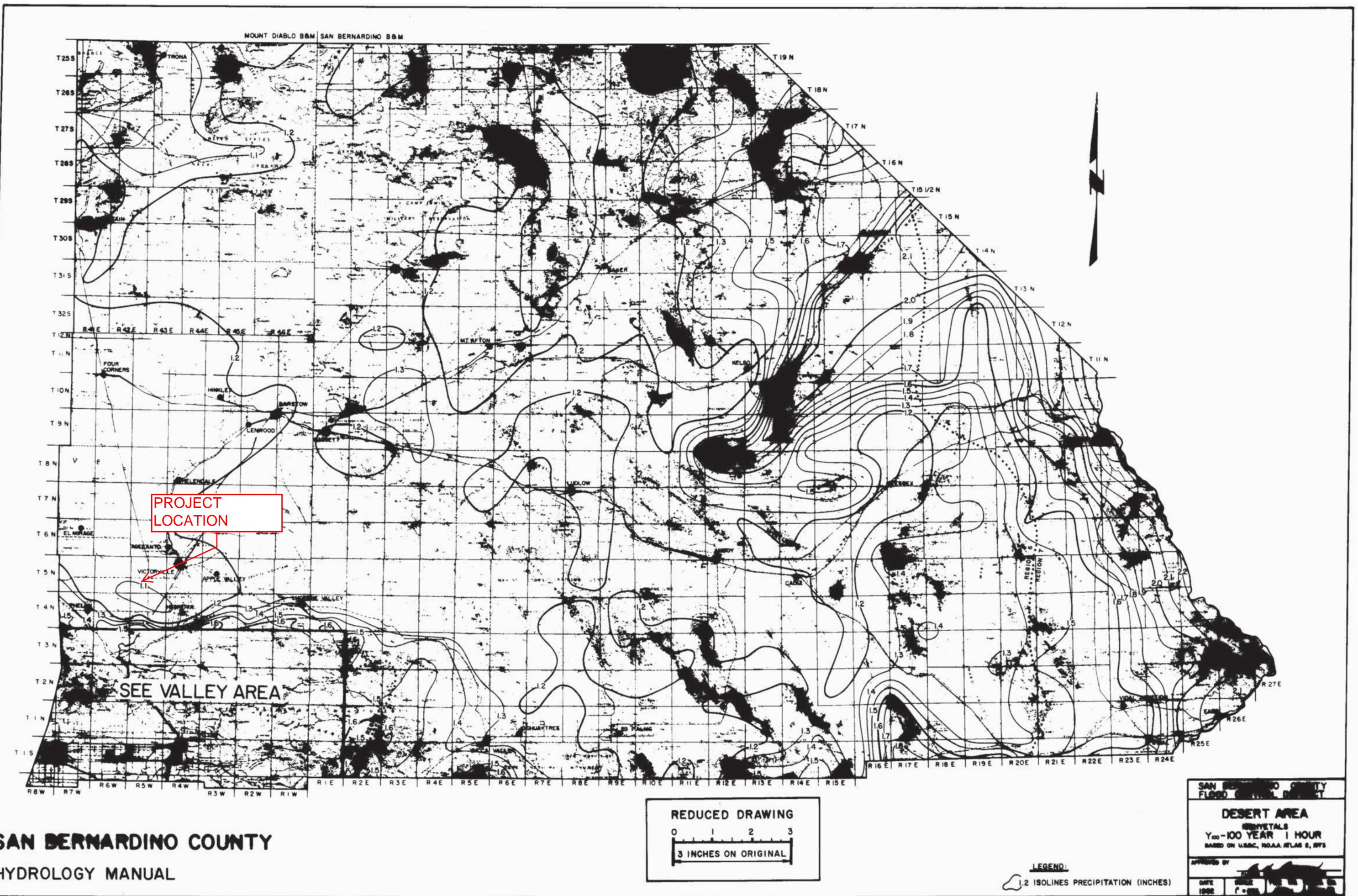
MADOLE
& ASSOCIATES, INC.
Engineering Communities for Life
9302 PITTSBURGH AVE, SUITE 230
RANCHO CUCAMONGA, CA 91730
PHONE: 909.481.6322
FAX: 909.481.6320

1 OF 1

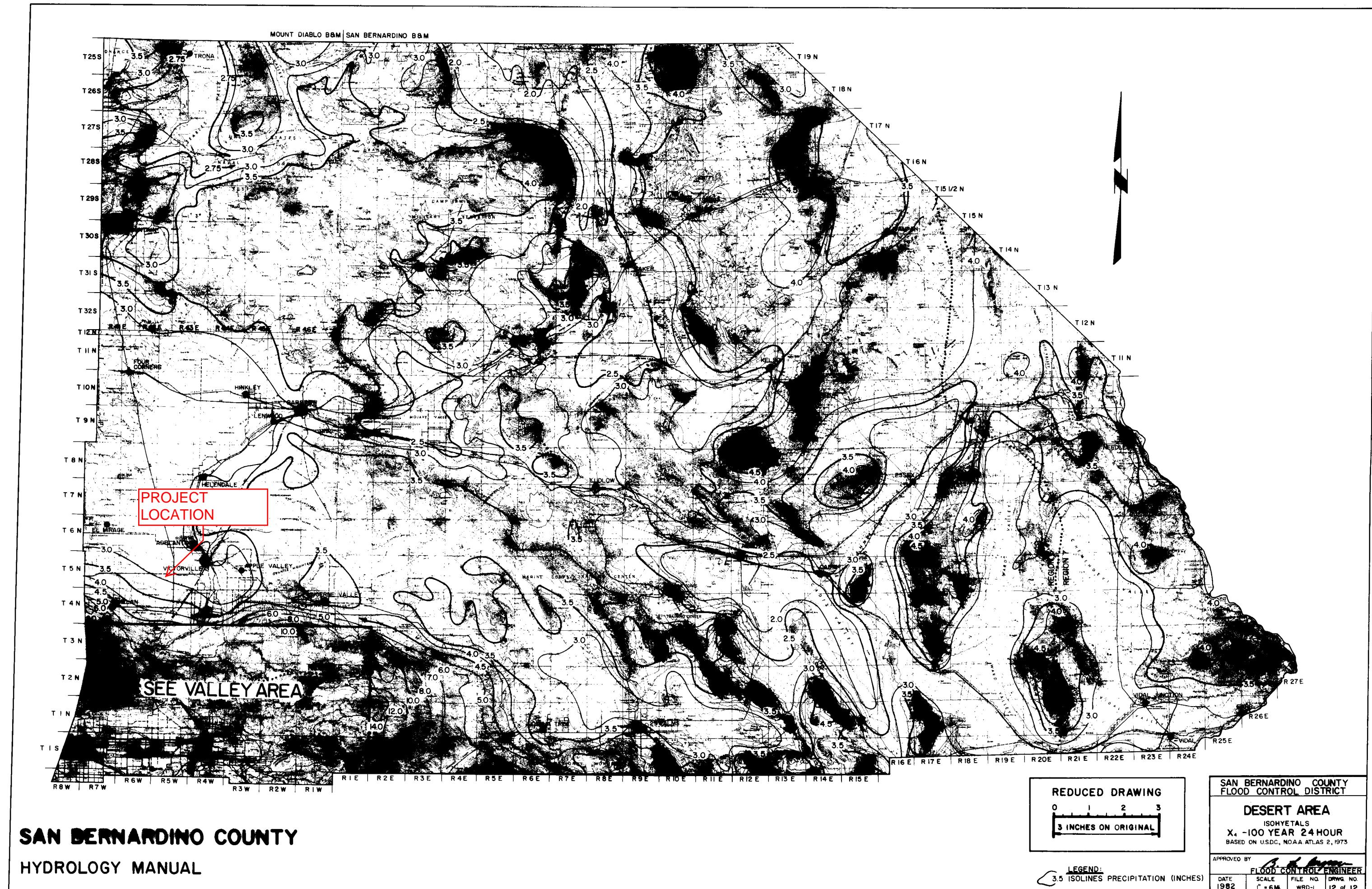
SCALE:
1" = 100'
JOB NUMBER:
652-2039
SHEET

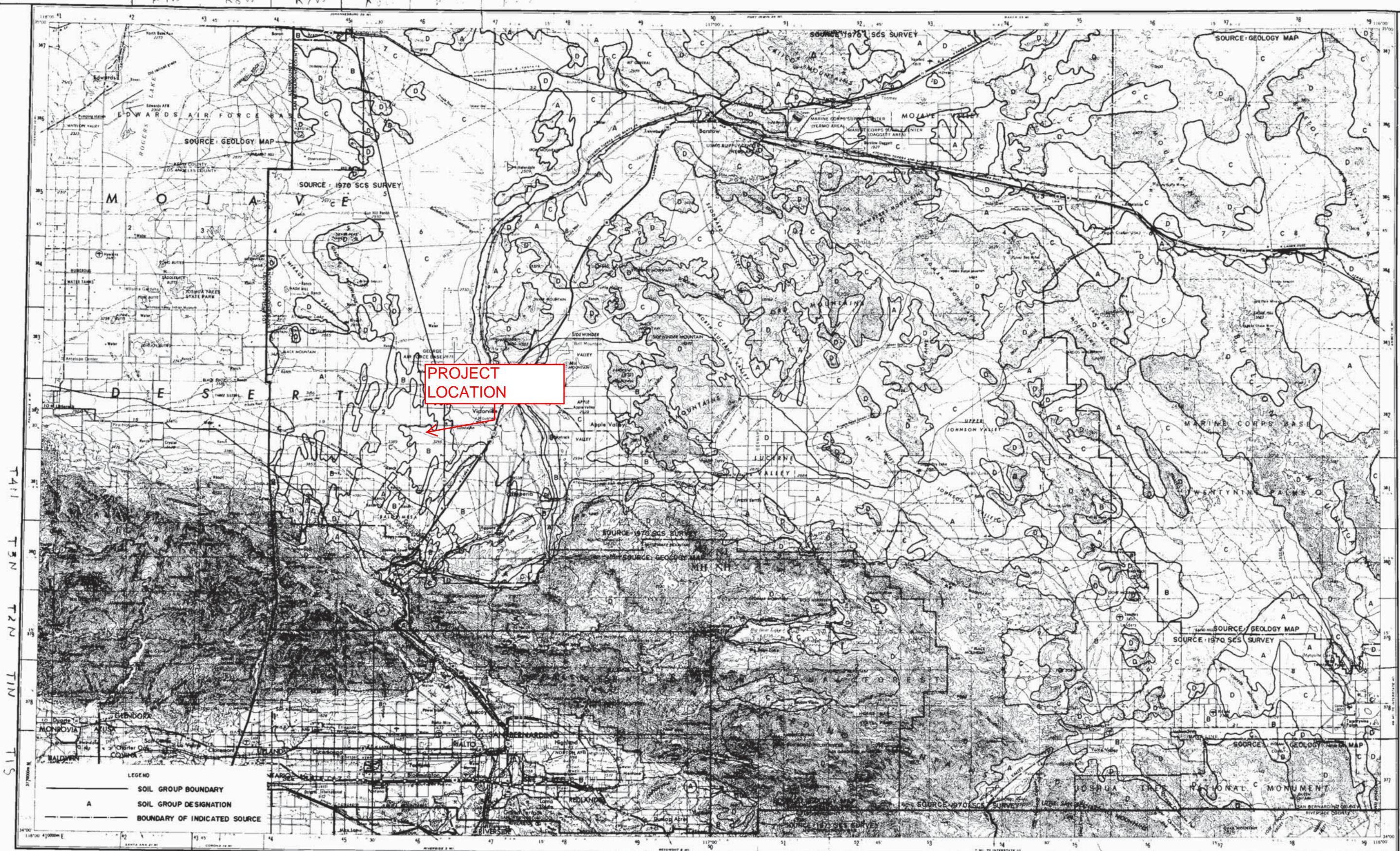
TENTATIVE TRACT MAP NO. 20275

RAINFALL INTENSITY DATA,
SOIL GROUP MAP,
IMPERVIOUS COVER
FOR DEVELOPED AREAS

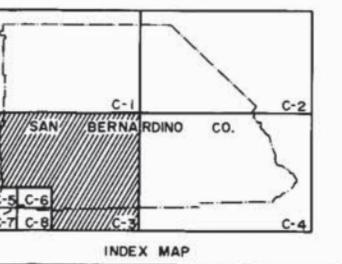


SAN BERNARDINO COUNTY HYDROLOGY MANUAL





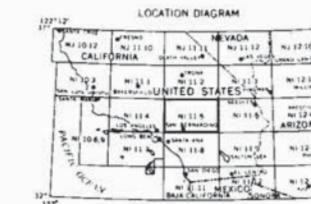
SAN BERNARDINO COUNTY HYDROLOGY MANUAL



Scale 1:250,000

 5 0 5 10 15 20 25 30 Kilometers

 0 5 10 15 Nautical Miles
 CONTOUR INTERVAL 200 FEET
 WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS
 TRANSVERSE MERCATOR PROJECTION
 BLACK NUMBERED LINES INDICATE THE 10,000 METER UNIVERSAL TRANSVERSE MERCATOR GRID, ZONE II
 1958 MAGNETIC DECLINATION FROM TRUE NORTH VARIES FROM 19°15' ZERO MILLS EASTWARD FOR
 THE CENTER OF THE WEST EDGE TO 19°20' MILLS EASTWARD FOR THE CENTER OF THE EAST EDGE
 BASE MAP REPRODUCED FROM U.S.G.S. "SAN BERNARDINO" TOPOGRAPHIC MAP
SCALE REDUCED BY 1/2



**HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHCENTRAL AREA**

**WQMP Project Report****County of San Bernardino Stormwater Program**

Santa Ana River Watershed Geodatabase

Thursday, May 02, 2019

Note: The information provided in this report and on the Stormwater Geodatabase for the County of San Bernardino Stormwater Program is intended to provide basic guidance in the preparation of the applicant's Water Quality Management Plan (WQMP) and should not be relied upon without independent verification.

Project Site Parcel Number(s):	313311101
Project Site Acreage:	38.995
HCOC Exempt Area:	No
Closest Receiving Waters: <small>(Applicant to verify based on local drainage facilities and topography.)</small>	System Number - See Note Facility Name - See Note Owner - See Note
Closest channel segment's susceptibility to Hydromodification:	See Note
Highest downstream hydromodification susceptibility:	See Note
Is this drainage segment subject to TMDLs?	See Note
Are there downstream drainage segments subject to TMDLs?	See Note
Is this drainage segment a 303d listed stream?	See Note
Are there 303d listed streams downstream?	See Note
Are there unlined downstream waterbodies?	See Note
Project Site Onsite Soil Group(s):	B
Environmentally Sensitive Areas within 200':	DESERT TORTOISE HABITAT CAT 2
Groundwater Depth (FT):	No data available
Parcels with potential septic tanks within 1000':	No
Known Groundwater Contamination Plumes within 1000':	No

Studies and Reports Related to Project Site:

Note: No drainage facilities located within 2 miles of site.

ACTUAL IMPERVIOUS COVER			
Land Use (1)	Range-Percent		Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0	-	0
Public Park	10	-	15
School	30	-	40
Single Family Residential: (3)			
2.5 acre lots	5	-	10
1 acre lots	10	-	20
2 dwellings/acre	20	-	30
3-4 dwellings/acre	30	-	40
5-7 dwellings/acre	35	-	50
8-10 dwellings/acre	50	-	60
More than 10 dwellings/acre	65	-	80
Multiple Family Residential:			
Condominiums	45	-	65
Apartments	65	-	80
Mobile Home Park	60	-	75
Commercial, Downtown Business or Industrial	80	-	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.
2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area shall always be made, and a review of aerial photos, where available, may assist in estimating the percentage of impervious cover in developed areas.
3. For typical equestrian subdivisions increase impervious area 5 percent over the values recommended in the table above.

**SAN BERNARDINO COUNTY
HYDROLOGY MANUAL**

**ACTUAL IMPERVIOUS COVER
FOR
DEVELOPED AREAS**